Color Television **Chassis**

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Service
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Service



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Service Manual

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PHILIPS

1. Technical Specifications, Connections and Chassis Overview

1.1 Technical Specifications

Tuning - technology	:	PLL
Tuning - presets/channels	:	181
Freq Bands	:	Full-Cable
TV Systems Off Air/ Cable	:	NTSC M (3.58 - 4.5)
TV Systems Multi	:	NTSC
Mains voltage	:	180-240V (29PT6457/44)
	:	100-120V (29PT6457/55)
Mains frequency	:	50/60Hz
Power consumption	:	90W (29PT6457/44)
	:	95W (29PT6457/55)
Standby Power consumption	:	<3W (29PT6457/44)
	:	<1W (29PT6457/55)
Sound Systems	:	BTCS SAP
Audio output (RMS)	:	2x5W
Scan Modes	:	4:3
Sound Features	:	AVL, Mute
Sound Control	:	4 sound modes
	:	Balance
	:	Bass Boost
	:	Treble Boost,
	:	Volume
Menu Languages	:	American English, French, Spanish
Clock/Timer Function	:	Sleep timer
Terrestrial Antenna in	:	75 Ohm (F type)

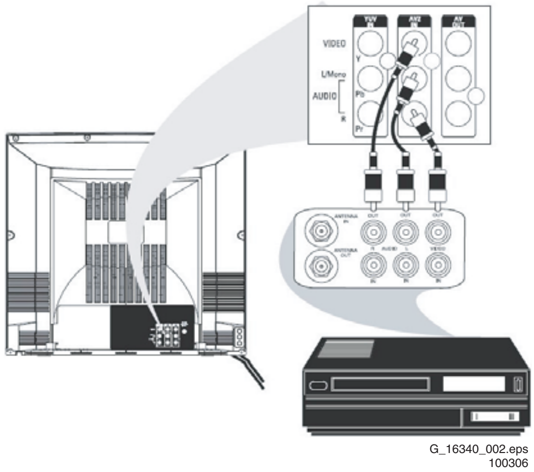


Figure 1-2 Rear audio and video connections

Cinch: Video CVBS - Out, Audio - Out

Ye - Video CVBS	1 V_{PP} / 75 ohm	
Wh - Audio L	0.5 V_{RMS} /10 kohm	
Rd - Audio R	0.5 V_{RMS} / 10 kohm	

Cinch: Video YUV- In

Gn - Video Y	1 V_{PP} / 75 ohm	
Bu - Video U	0.7 V_{PP} / 75 ohm	
Rd - Video V	0.7 V_{PP} / 75 ohm	

Cinch: Audio - Out

Rd - Audio - R	0.5 V_{RMS} / 10 kohm	
Wh - Audio - L	0.5 V_{RMS} / 10 kohm	

1.2 Connection overview

1.2.1 Connections

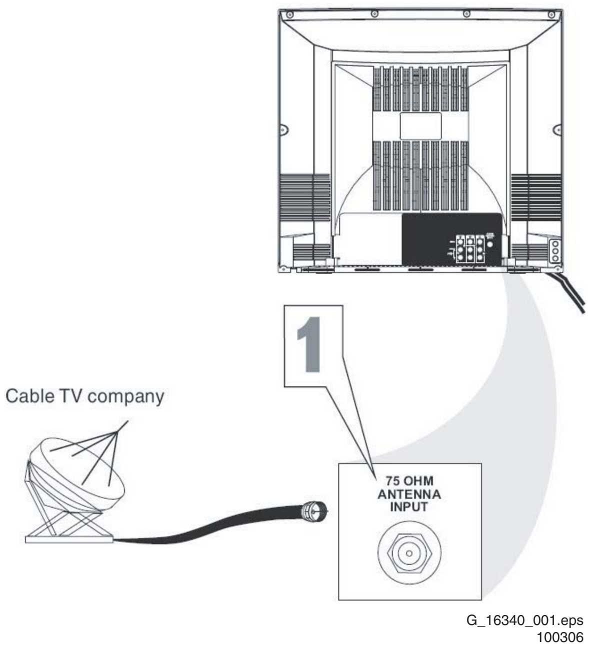


Figure 1-1 Aerial connection

Aerial - In

- - F-type Coax, 75 ohm

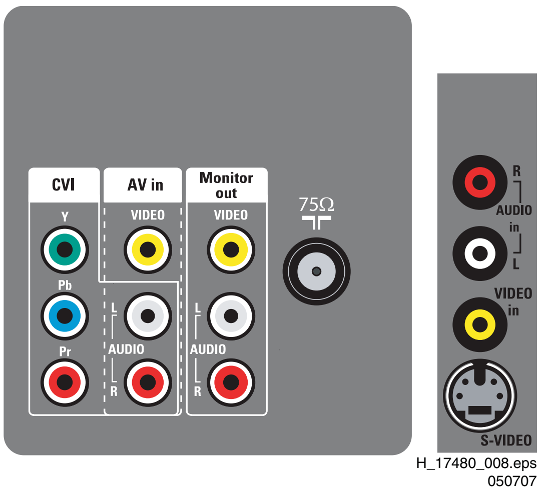


Figure 1-3 Side audio and video connections

S-Video (Hosiden): Video Y/C - In

1 - Ground Y	Gnd	
2 - Ground C	Gnd	
3 - Video Y	1 V_{PP} / 75 ohm	
4 - Video C	0.3 V_{PP}P / 75 ohm	

Cinch: Video CVBS - In, Audio - In

Ye - Video CVBS	1 V_{PP} / 75 ohm	
Wh - Audio L	0.5 V_{RMS} / 10 kohm	
Rd - Audio R	0.5 V_{RMS} / 10 kohm	

1.3 Chassis Overview

See Chapter 10, Parts List.

2. Safety Instructions, Warnings, and Notes

Index of this chapter:
2.1 Safety Instructions
2.2 Maintenance Instructions
2.3 Warnings
2.4 Notes

2.1 Safety Instructions

Safety regulations require the following **during** a repair:
- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.
- Wear safety goggles when you replace the CRT.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:
- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current flows. In particular this is valid for the:
  1. Pins of the line output transformer (LOT).
  2. Fly-back capacitor(s).
  3. S-correction capacitor(s).
  4. Line output transistor.
  5. Pins of the connector with wires to the deflection coil.
  6. Other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections, and is therefore only necessary for television sets more than two years old.
- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets that have a Mains/AC Power isolated power supply):
  1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
  2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
  3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
  4. Switch "off" the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

2.2 Maintenance Instructions

We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:
- When a customer uses the set under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When a customer uses the set in an environment with higher dust, grease, or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the "general repair instruction" noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in figure "Discharge picture tube", to discharge the picture tube. Use a high voltage probe and a multi-meter (position V_{DC}). Discharge until the meter reading is 0 V (after approx. 30 s).

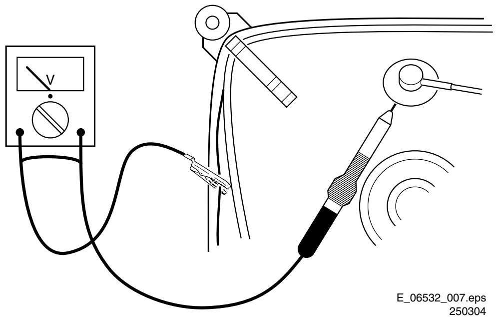


Figure 2-1 Discharge picture tube

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential. Available ESD protection equipment:
  – Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
  – Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and prevents circuits from becoming unstable.

2.4 Notes

2.4.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a color bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (⏉) and without (⏉̸) aerial signal. Measure the voltages in the power supply section both in normal operation (⏽) and in stand-by (⏻). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the

semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. “Dolby”, “Pro Logic” and the “double-D symbol”, are trademarks of Dolby Laboratories.

2.4.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads (μ= x10^{-6}), nano-farads (n= x10^{-9}), or pico-farads (p= x10^{-12}).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.4.3 Rework on BGA (Ball Grid Array) ICs

General
Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

Device Removal
As is the case with any component that is being removed, it is essential when removing an (LF)BGA, that the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the risk of warping the PWB.
To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

Area Preparation
When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA.
Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.
After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.
Note: Do not apply solder paste, as this has been shown to result in problems during re-soldering.

Device Replacement
The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers.
So as not to damage neighboring components, it may be necessary to reduce some temperatures and times.

More Information
For more information on how to handle BGA devices, visit this URL: *www.atyourservice.ce.philips.com* (needs subscription, not available for all regions). After login, select “Magazine”, then go to “Repair downloads”. Here you will find Information on how to deal with BGA-ICs.

2.4.4 Lead-free Solder

Philips CE is producing lead-free sets (PBF) from 1.1.2005 onwards.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 5 and 6 refer to the production year, digits 7 and 8 refer to production week (in example below it is 1991 week 18).



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Figure 2-2 Serial number example

Regardless of the special lead-free logo (which is not always indicated), one must treat all sets from this date onwards according to the rules as described below.

Figure 2-3 Lead-free logo

Due to lead-free technology some rules have to be respected by the workshop during a repair:
- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
  – To reach a solder-tip temperature of at least 400°C.
  – To stabilize the adjusted temperature at the solder-tip.
  – To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch “off” unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly **to avoid** mixed regimes. If this cannot be avoided, carefully clean the solder-joint from old tin and re-solder with new tin.
- Use only original spare-parts listed in the Service-Manuals. Not listed standard material (commodities) has to be purchased at external companies.
- Special information for lead-free BGA ICs: these ICs will be delivered in so-called "dry-packaging" to protect the IC against moisture. This packaging may only be opened shortly before it is used (soldered). Otherwise the body of the IC gets "wet" inside and during the heating time the structure of the IC will be destroyed due to high (steam-) pressure inside the body. If the packaging was opened before usage, the IC has to be heated up for some hours (around 90°C) for drying (think of ESD-protection!).
  Do not re-use BGAs at all!

- For sets produced before 1.1.2005, containing leaded soldering tin and components, all needed spare parts will be available till the end of the service period. For the repair of such sets nothing changes.

In case of doubt whether the board is lead-free or not (or with mixed technologies), you can use the following method:
- Always use the highest temperature to solder, when using SAC305 (see also instructions below).
- De-solder thoroughly (clean solder joints to avoid mix of two alloys).

Caution: For BGA-ICs, you **must** use the correct temperature-profile, which is coupled to the 12NC. For an overview of these profiles, visit the website *www.atyourservice.ce.philips.com* (needs subscription, but is not available for all regions)
You will find this and more technical information within the "Magazine", chapter "Repair downloads".
For additional questions please contact your local repair help desk.

2.4.5 Alternative BOM identification

In September 2003, Philips CE introduced a change in the way the serial number (or production number, see Figure 2-1) is composed. From this date on, the **third digit** in the serial number (example: AG**2**B0335000001) indicates the number of the alternative BOM (Bill of Materials used for producing the specific model of TV set). It is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different O.E.M.s.
By looking at the third digit of the serial number, the service technician can see if there is more than one type of B.O.M. used in the production of the TV set he is working with. He can then consult the At Your Service Web site, where he can type in the Commercial Type Version Number of the TV set (e.g. 28PW9515/12), after which a screen will appear that gives information about the number of alternative B.O.M.s used.
If the third digit of the serial number contains the number 1 (example: AG**1**B033500001), then there is only one B.O.M. version of the TV set on the market. If the third digit is a 2 (example: AG**2**B0335000001), then there are two different B.O.M.s. Information about this is important for ordering the correct spare parts!
For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26 = 35 different B.O.M.s can be indicated by the third digit of the serial number.

2.4.6 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages**. While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3. Directions for Use

You can download this information from the following websites:
http://www.philips.com/support
http://www.p4c.philips.com

4. Mechanical Instructions

See Chapter 10, Parts List.

5. Service Modes, Error Codes, and Fault Finding

5.1 Trouble Shooting

5.1.1 Can not Power On

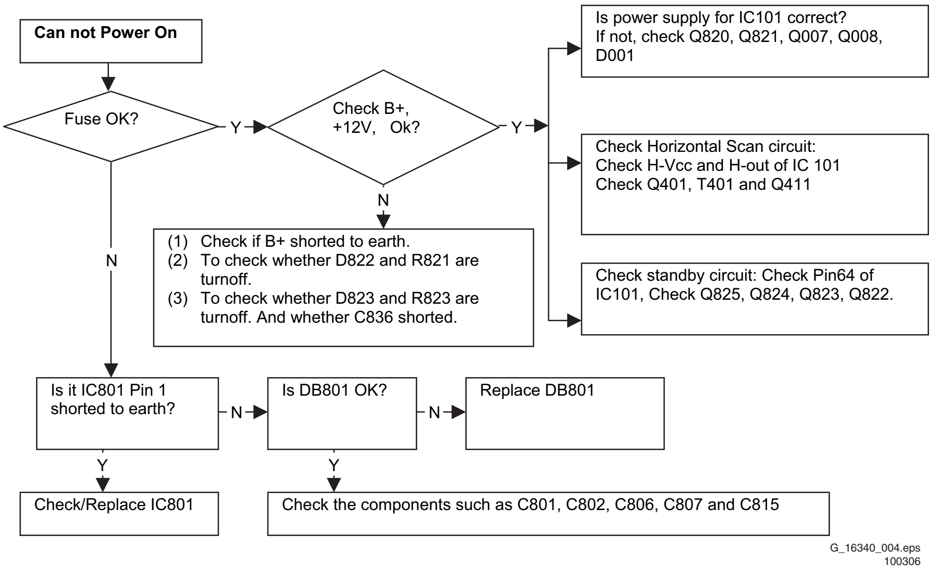


Figure 5-1 Can not Power On

5.1.2 No Raster, Sound OK

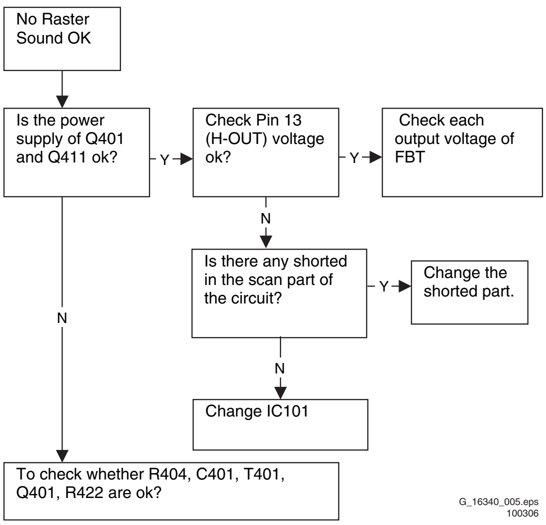


Figure 5-2 No Raster, Sound OK

5.1.3 Raster OK, Sound OK, No TV/AV picture

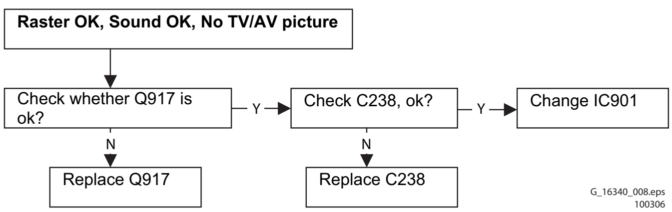


Figure 5-3 Raster OK, Sound OK, No TV/AV picture

5.1.4 Raster OK, Sound OK, No AV picture

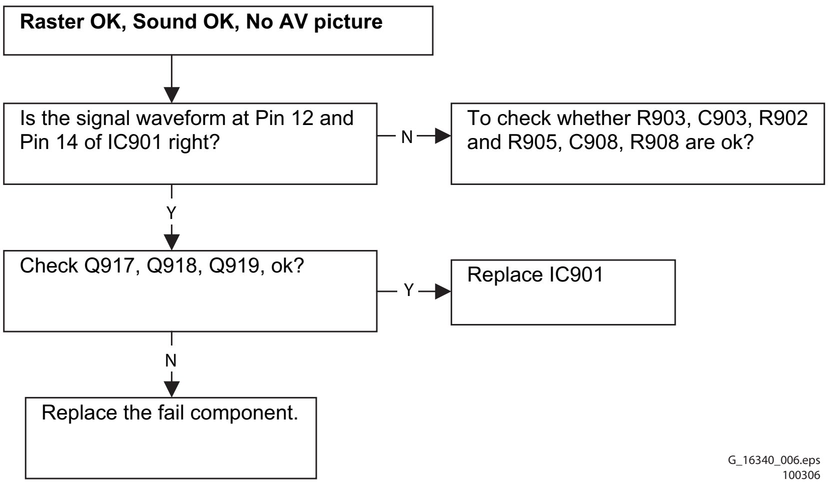


Figure 5-4 Raster OK, Sound OK, No AV picture

5.1.5 Raster OK, Sound OK, No TV picture

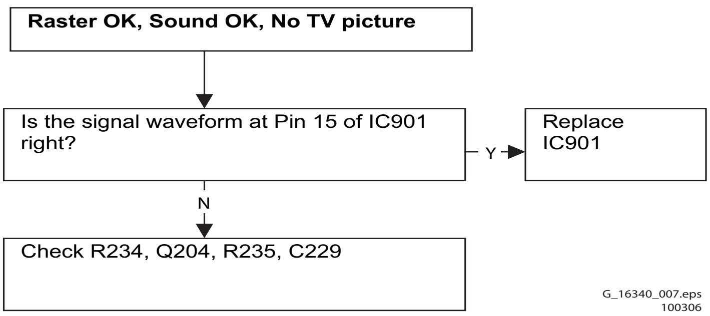


Figure 5-5 Raster OK, Sound OK, No TV picture

5.1.6 No picture, dense noise dots

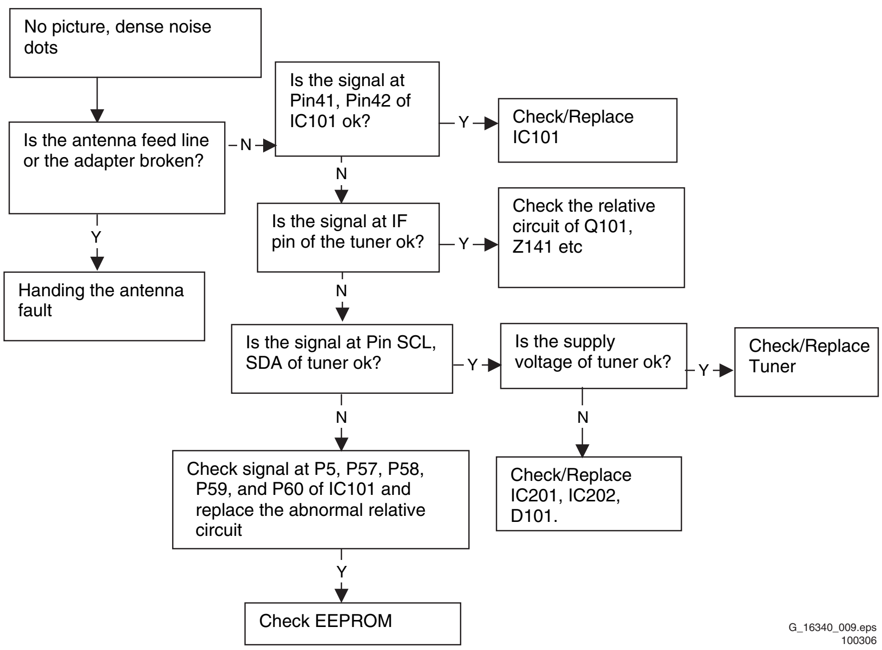
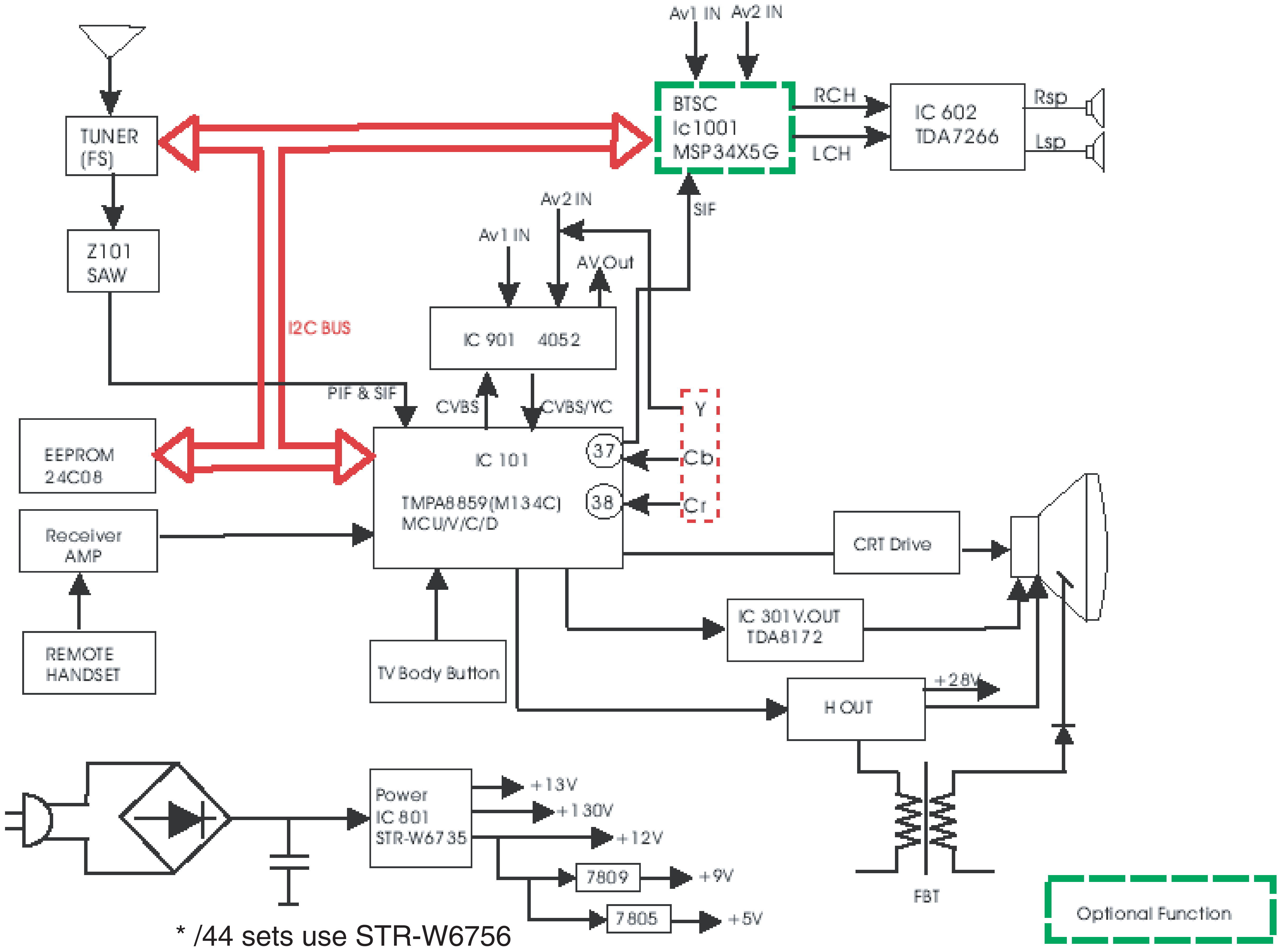


Figure 5-6 No picture, dense noise dots

6. Block Diagrams, Test Point Overviews, and Waveforms

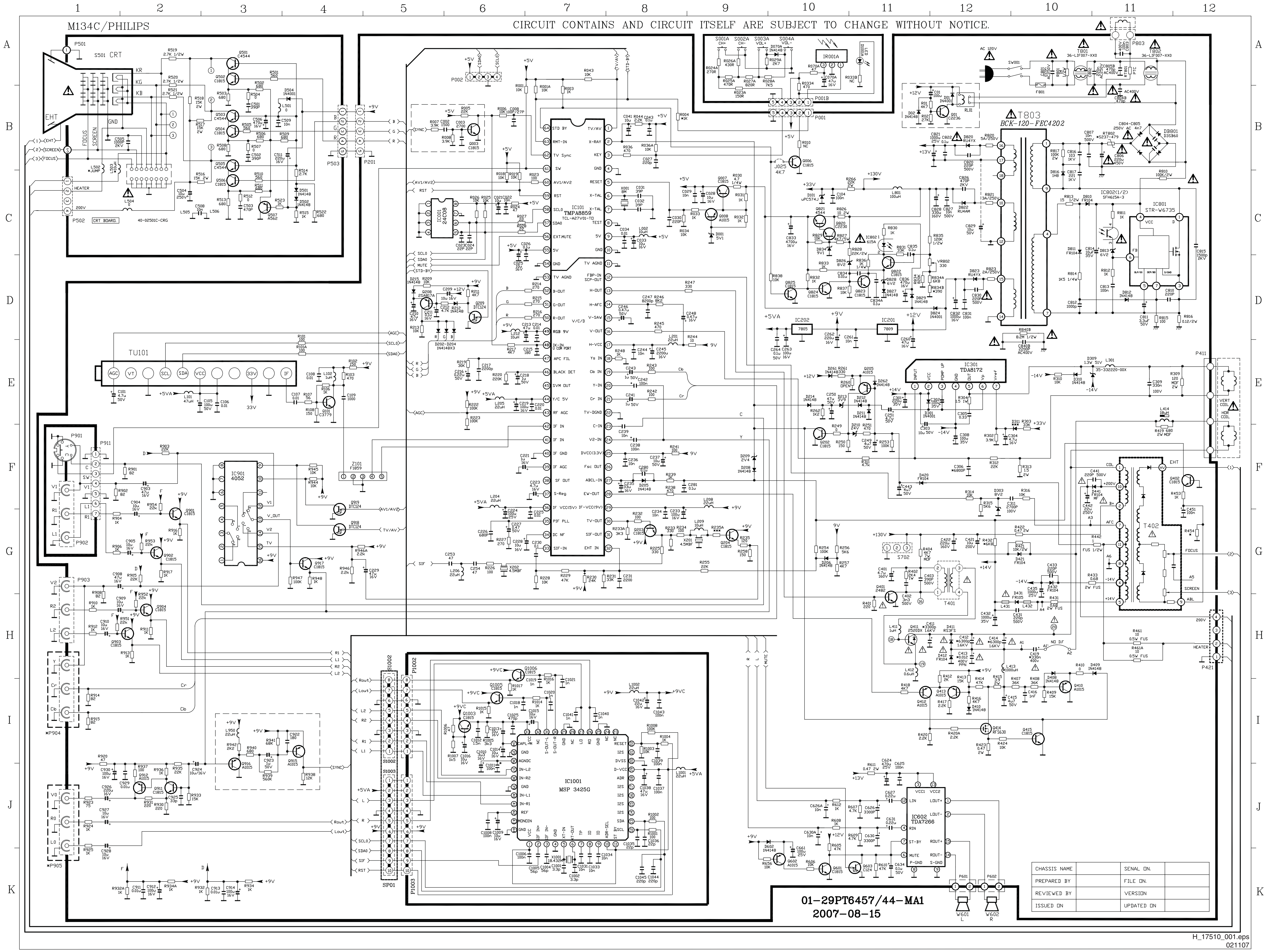
Chassis Block Diagram



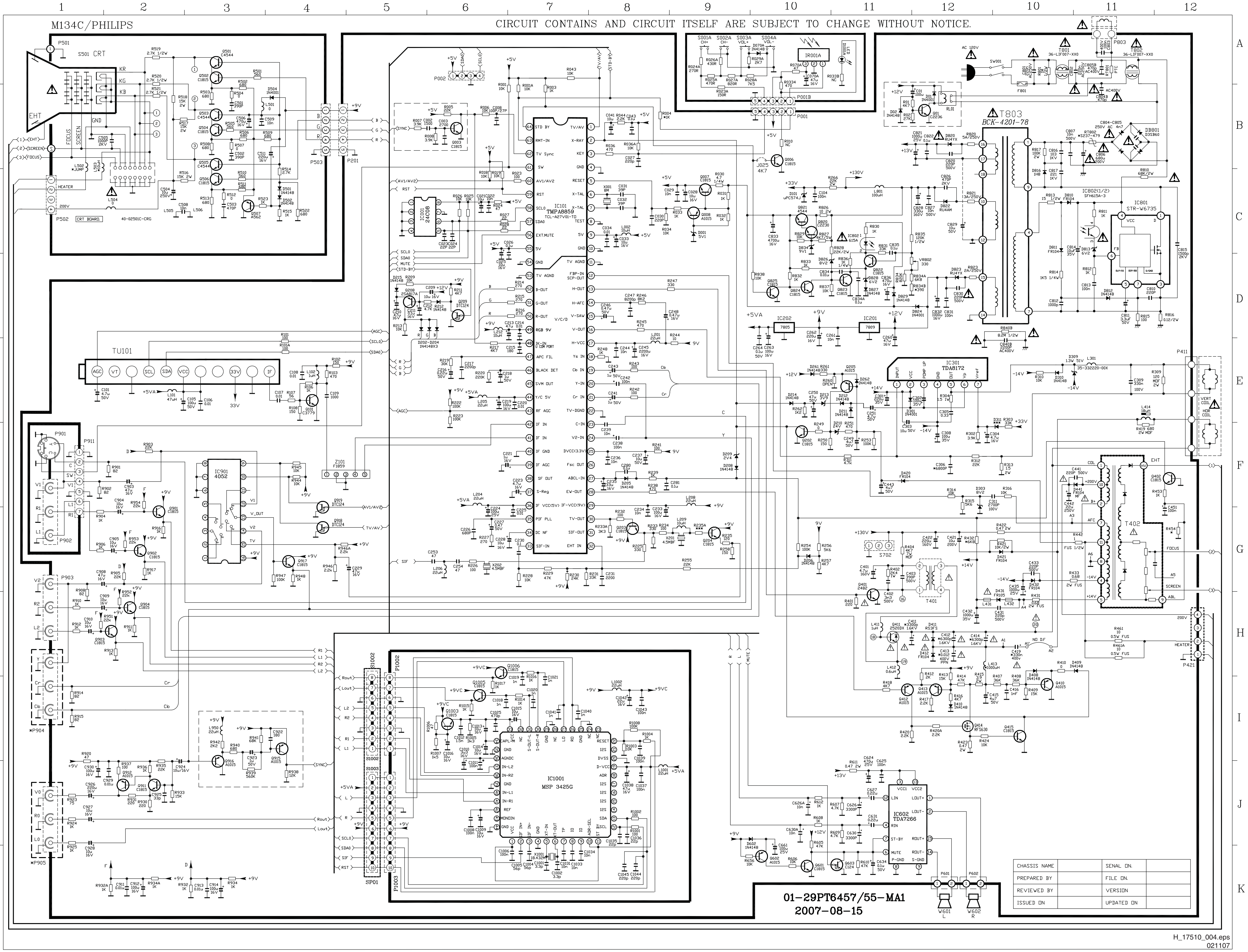
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7. Circuit Diagrams and CBA Layouts

Main Board 01-29PT6457/44-MA1

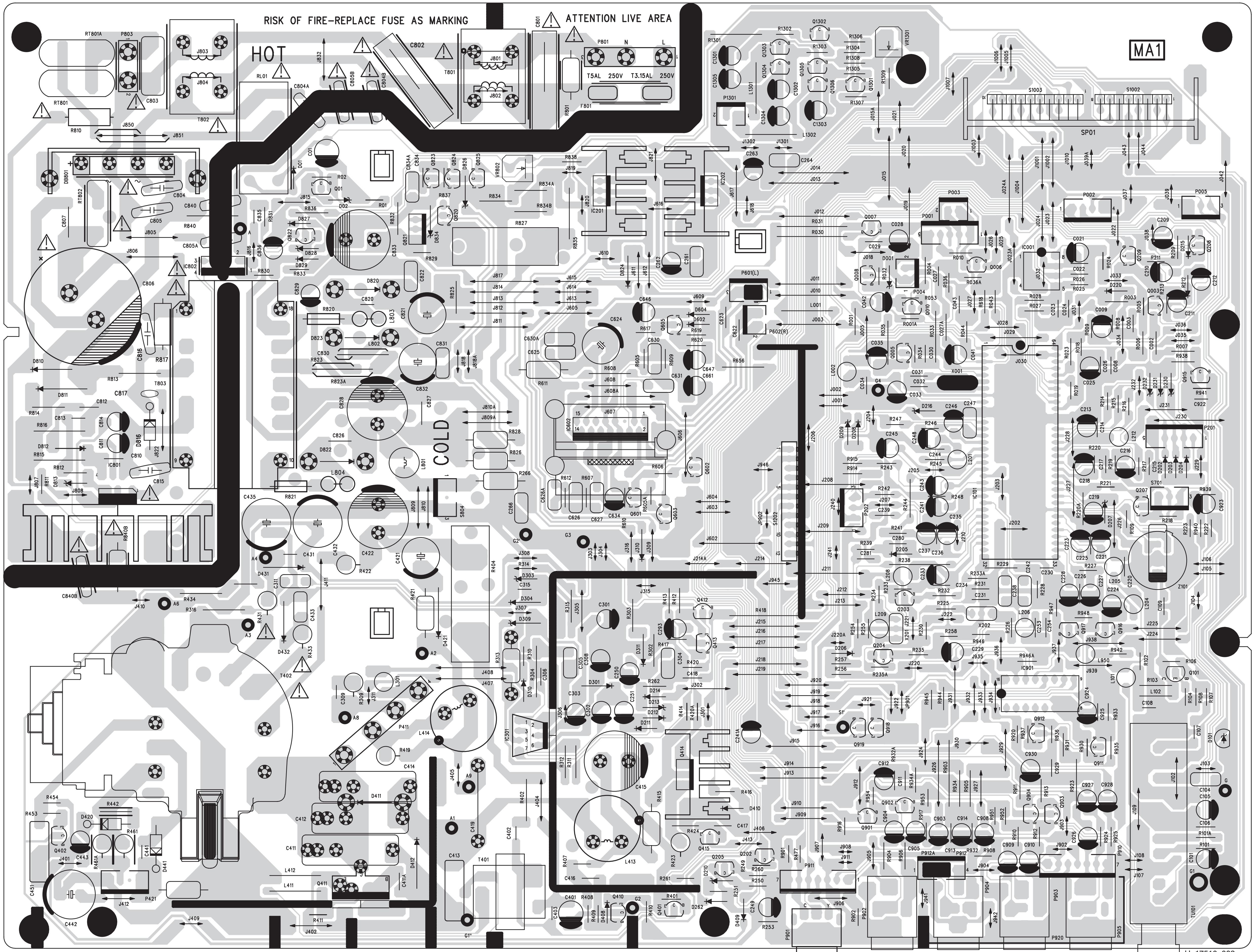


Main Board 01-29PT6457/55-MA1



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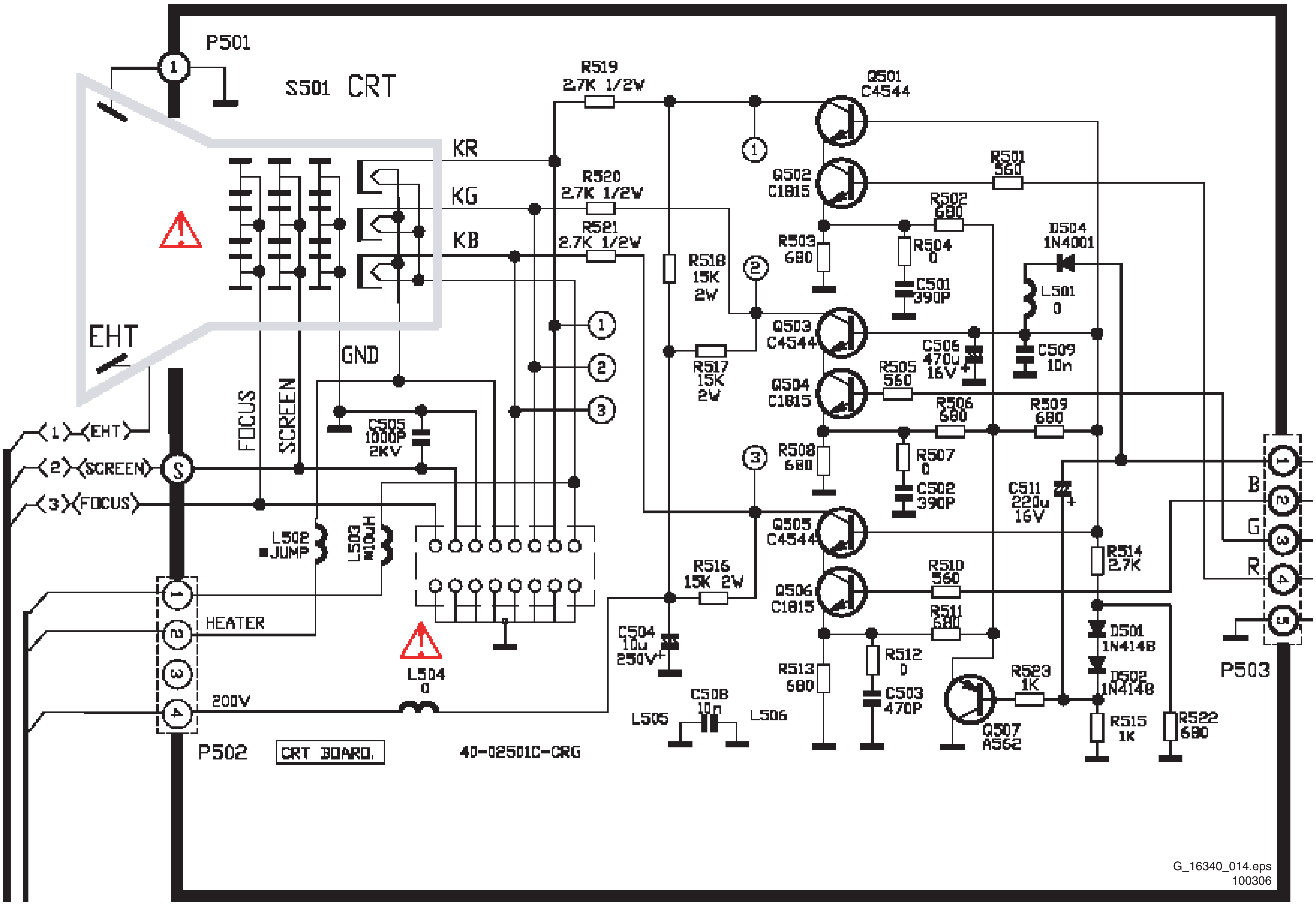
Layout Main Board 40-TB59PH-MAB1XG (Top Side)



40-TB59PH-MAB1XG.pcb - Mon Aug 27 14:39:08 2007

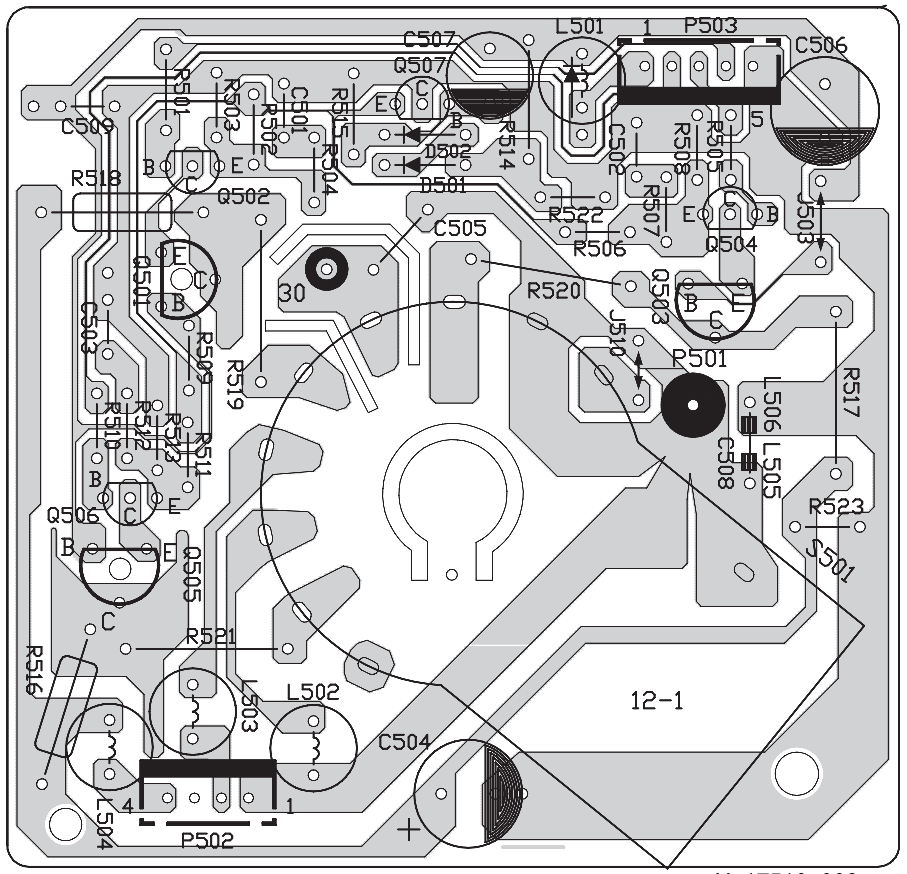
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CRT Panel



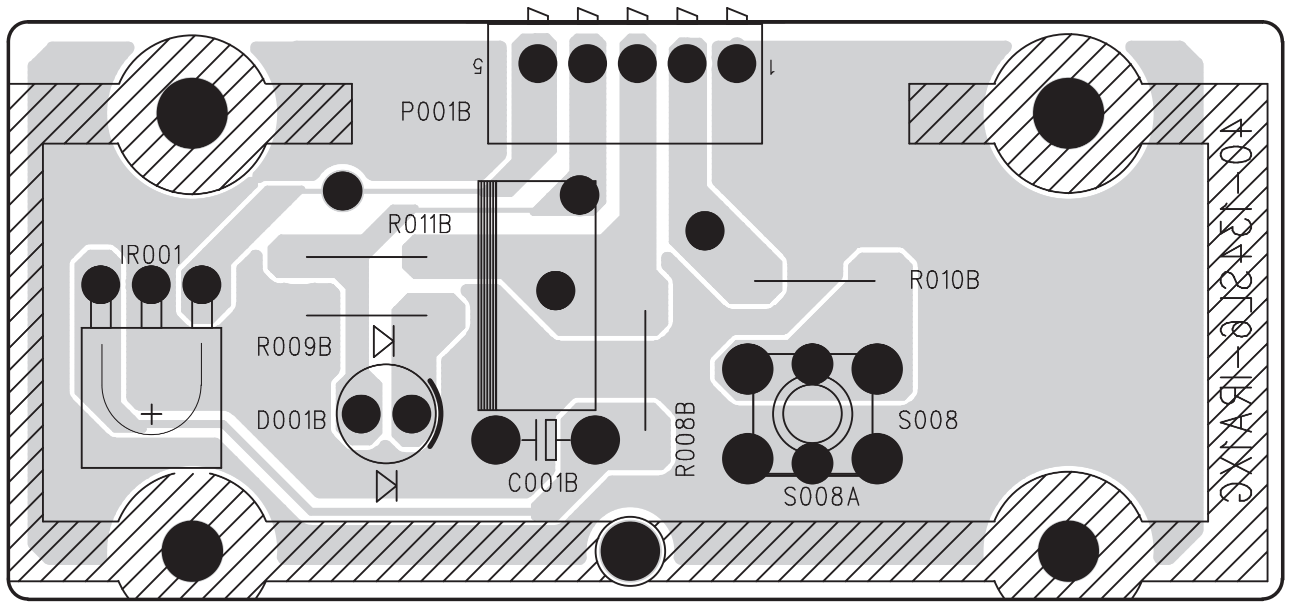
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Layout CRT Panel



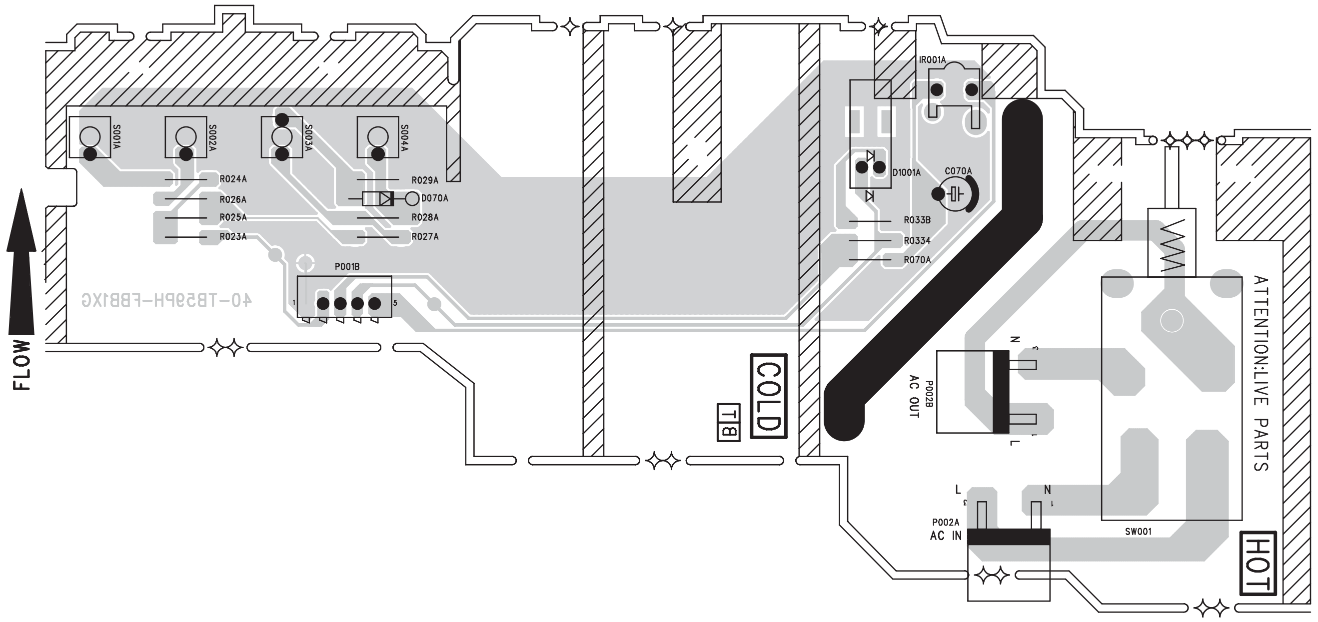
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Side I/O Panel 40-TB59PH-SIA1XG



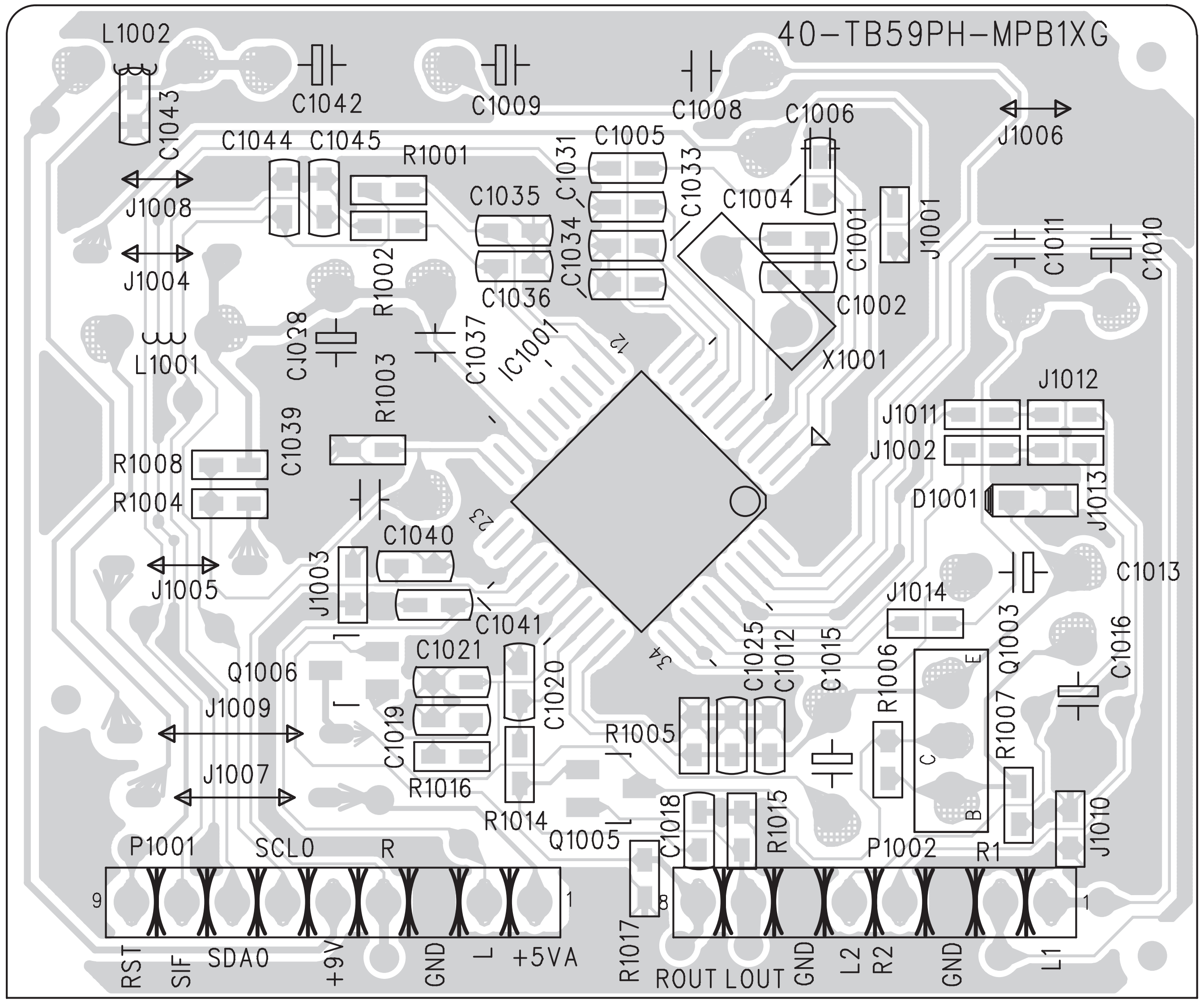
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Layout Front IR Panel 40-TB59PH-FBB1XG



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Layout BTSC Panel 40-TB59PH-MPB1XG



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8. Alignments

8.1 How to Put the Set into Factory Mode

- Press the “D-MODE” button on the remote control.
- Press the “OK” button on the remote control.
- Press the “CH+” or the “CH-” button to select the parameter you want to adjust.
- Press the “VOL+” or the “VOL-” button to adjust the selected parameter.
- To put the new values into the memory, leave the factory mode with the “D_MODE” button on the remote control.

8.2 Adjustment of the B+ (BAT) voltage

1. Apply the Philips standard test pattern to the RF input.
2. Connect a DC voltmeter (range >200 V) to pins 1 (GND) and 3 (+) of S804 [1].
3. Adjust potentiometer VR802 [2] in STANDARD mode in such a way the voltage reading is 130 +/- 0.5 V.

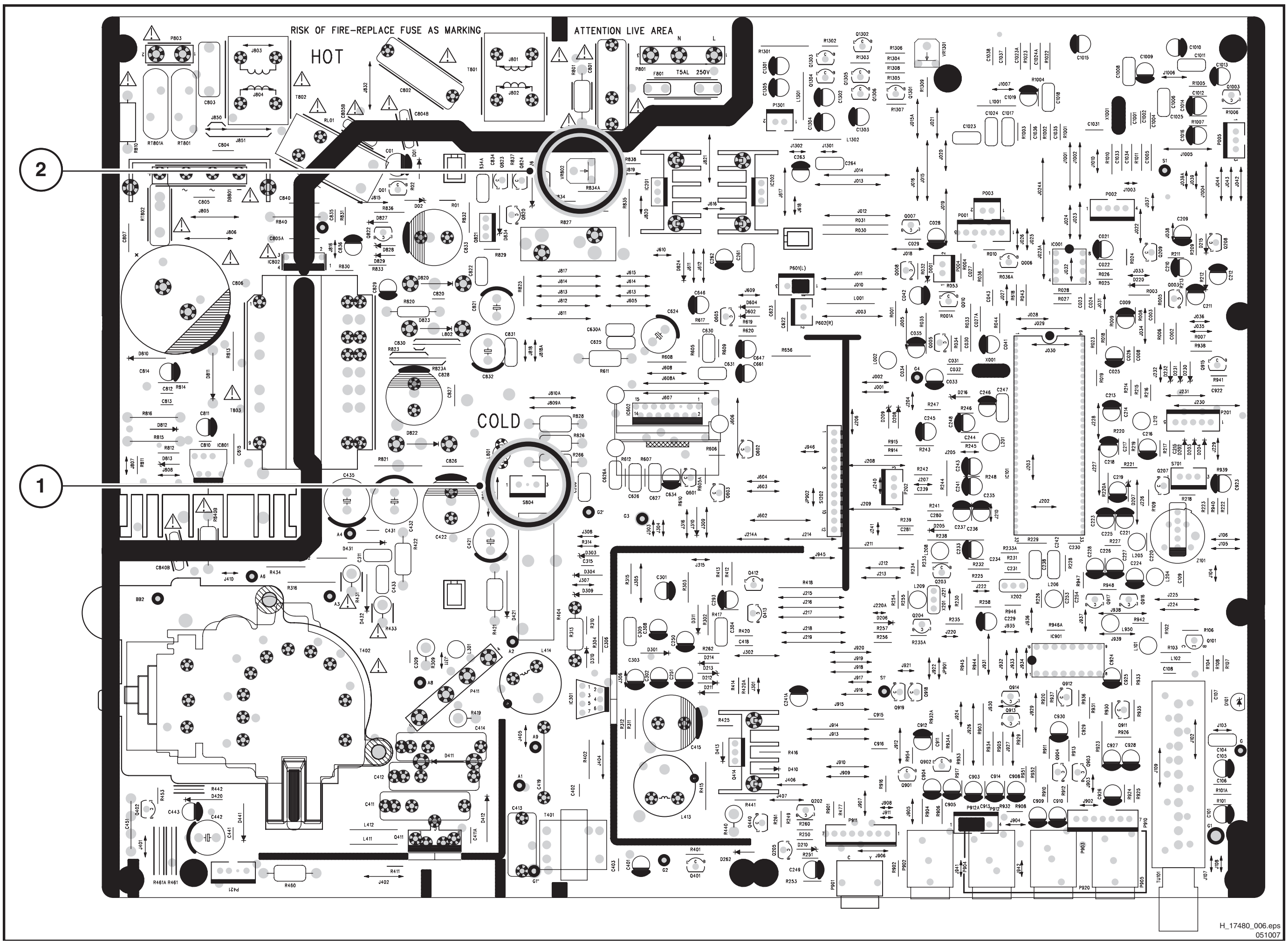
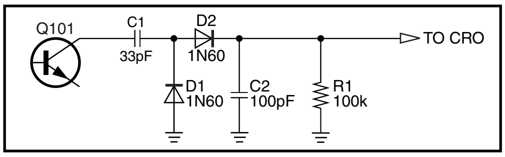


Figure 8-1 Test pin & potentiometer position

8.3 RF AGC Alignment:

1. Connect a test circuit as depicted in figure “Test circuit”.
2. Apply an 8-scale gray signal (80 dBμV).
3. Adjust the AGC data until the output of the test circuit becomes 0.4 V (p-p) ±0.05 V.
4. Change the 8-scale gray signal to 60 dBμV.
5. The shown value of CRO should be the same as while receiving the 80 dBμV signal. If not, repeat step 3 and 4 until the results for 60 dBμV and 80 dBμV input signal are the same.



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Figure 8-2 Test circuit

8.4 Screen & Focus Voltage Adjustment

1. Apply the test pattern signal in normal status.
2. Enter the Factory mode
3. Press the "TV/AV" button to stop the vertical scan (Note: the RC/GC/BC is preset to 80, GD/BD to 40)
4. Adjust the SCREEN potentiometer on the line output transformer in such a way the horizontal line is just visible on the screen.
5. Measure the VG2 voltage with a High Voltage Meter and a High Voltage Test stick (1000:1). The VG2 voltage should be 675 ±50 V.
6. Turn on the vertical output, and adjust the "FOCUS" potentiometer on the line output transformer in such a way the focus is maximized. The "FOCUS" voltage should be within the range of 7 - 8.0 kV.

8.5 White Balance Adjustment (NORMAL)

Normal color temperature adjustment.
1. In Rich Status, choose a $^1/_2$ grey and $^1/_2$ white pattern from AV input (Color Temperature = normal).
2. Adjust Brightness & Contrast until at the grey side Y = 5 ±1 Nits and at the white side Y = 85 ±10 Nits.
3. Use color analyzer to measure the grey side of the screen. By adjusting the value of RC, GC and BC, set the reading of the color analyzer x = 274 ±8 and y = 280 ±8.
4. Use color analyzer to measure the white side of the screen. By adjusting the GD and BD, set the reading of the color analyzer to x = 274 ±8 and y = 280 ±8.
5. Repeat steps 2 to 4 until the reading of the color analyzer is correct on both grey and white picture.

Cool color temperature adjustment.
1. In Rich status, choose a $^1/_2$ grey and $^1/_2$ white pattern from AV input (Color Temperature = cool).
2. Adjust RC-C, GC-C, BC-C, GD-C and BD-C as described in 2, 3, 4 and 5 of the "Normal color temperature adjustment" procedure until you have reached a reading on the color analyzer of x = 263 ±8 and y = 265 ±8.

Warm color temperature adjustment.
1. In Rich status, choose a $^1/_2$ grey and $^1/_2$ white pattern from AV input (Color Temperature = warm).
2. Adjust RC-W, GC-W, BC-W, GD-W and BD-W as described in 2, 3, 4 and 5 of the "Normal color temperature adjustment" procedure until you have reached a reading on the color analyzer of x = 291 ±8 and y = 300 ±8.

CVI color temperature adjustment.
1. In Rich status, choose a $^1/_2$ grey and $^1/_2$ white pattern from CVI input (Color Temperature = normal).
2. Adjust YUVRC, YUVGC, YUVBC, YUVGD and YUVBD as described in 2, 3, 4 and 5 of the "Normal color temperature adjustment" procedure until you have reached a reading on the color analyzer of x = 274 ±8 and y = 280 ±8.

8.6 Adjustment of Sub-brightness

1. In Rich & Normal status, apply standard grey & white pattern via RF (NTSC-M).
2. Test the brightness of grey side of the picture to meet BRTS 17 - 21 Nits.

8.7 Picture Geometry Adjustment

1. Apply the Philips NTSC standard testing pattern in normal status.
2. Then enter menu 3.
3. Adjust the following data to get the minimum distortion:
   a. HPOS6 (Horizontal Centre).
   b. PARA6 (Level).
   c. TRAP6 (Trapezium).
   d. HSIZE6 (Horizontal Size).
   e. CNRT6 (Top).
   f. CNRB6 (Bottom).
4. Apply the Philips NTSC standard testing pattern in normal status.
5. Enter menu 3.
6. Adjust the following data to get the minimum distortion:
   a. HIGH6 (Height).
   b. VP60 (Vertical Center).
   c. VLIN6 (Linearity).
   d. VSC6 (Vertical-S Correction).
7. Apply the Philips PAL standard testing pattern in normal status.
8. Then enter menu 3.
9. Adjust the following data to get the minimum distortion:
   a. HPOS6 (Horizontal Centre).
   b. PARA6 (Level).
   c. TRAP6 (Trapezium).
   d. HSIZE6 (Horizontal Size).
   e. CNRT6 (Top).
   f. CNRB6 (Bottom).
10. Apply the Philips PAL standard testing pattern in normal status.
11. Enter menu 2.
12. Adjust the following data to get the minimum distortion:
    a. HIGH5 (Height).
    b. VP50 (Vertical Center).
    c. VLIN5 (Linearity).
    d. VSC5 (Vertical-S Correction).

8.8 The Peak White Adjustment

In Rich status and Color Temperature = Normal, apply the peak white signal with a 14x14 cm window to the AV input. Enter factory alignment menu 5, select SCNT to adjust the sub-contrast until the spec of the window is 285 ±15 Nits.

8.9 Initialization

Put the set into "Factory Mode" (see "How to Put the Set into Factory Mode", the first item of this chapter). Press the "SOUND" button, the screen displays "WAIT". When the screen displays "OK", the initialization is finished.

8.10 EEPROM Data:

Note: although all items are adjustable, we only recommend to adjust the items with an asterisk (*). The other items are adjustable as well, but we strongly discourage adjusting them.

Table 8-1 EEPROM Data

EEPROM data													
FAC 01					**FAC 02**								
RC*	GC*	BC*	GD*	BD*	HIGH5	VP50	VLIN5	VSC5	VBLK5	VCEN5			
80	80	80	40	40	1C	03	0C	0C	00	27			
FAC 02													
HIGH6*	VP60*	VLIN6*	VSC6*	VBLK6	VCEN6								
1C	03	0A	0C	00	29								
FAC 03													
HPOS5	PARA5	TRAP5	HSIZE5	CNRT5	CNRB5	VEHT5	HEHT5						
08	22	29	1A	06	09	03	03						
FAC 03													
HPOS6*	PARA6*	TRAP6*	HSIZE6*	CNRT6*	CNRB6*	VEHT6	HEHT6						
0C	1F	21	1B	09	0A	03	03						
FAC 04													
CNTX	CNTN	BRTX	BRTN	COLX	COLN	TNTX	TNTN						
7F	08	27	42	35	00	28	28						
FAC 05													
BRTC*	COLC	COLP	SCOL	SCNT	CNTC	TNTCT	TNTCV						
40	2C	00	04	04	67	40	40						
FAC 06													
ST3	SV3	SV4	SVD	ASSH	SHPX	SHPN							
20	20	19	19	07	3F	3F							
FAC 07													
MOD1	MOD2	MOD3	OPT	OPTM1	OPTM2	HDCNT	HSTOP						
20	B0	60	3F	C0	02	00	FF						
FAC 08													
RFAGC*	BRTS	OSD	OSDF	CCD OSD	CCD OSDF	TXCN	RGCN						
25	00	21	53	4A	65	1F	16						
FAC 09													
V01	V05	V10	V25	V50	V75	V90	V100						
46	4F	52	58	6A	6B	6C	6D						
FAC 10													
MODE4	MODE5	MODE6	MODE7	MODE8	MODE9								
12	0B	1F	95	8D	02								
FAC 11													
MPB-STR	MPB-HMC	MPB-HP	MPB-LP	MPB-LIM	SUB-FRE	SUB-HP	VOL-MAI						
43	0D	07	11	00	28	02	01						
FAC 12													
SVM	SVM1	OSD2	OSDF2	PYNX	PYNN	PYXS	PYNS						
05	05	20	64	28	18	22	10						
FAC 13													
CLTM	CLVO	CLVS	ABL	DCBS	FLG0	FLG1							
44	43	43	27	14	82	0D							
FAC 14							**FAC 15**						
HAFC	AGCC	NOIS	ONTM	NSHP	PVLVL	PLMT	RC-C	GC-C	BC-C	GD-C	BD-C	YUVGD	YUVBD
09	1C	01	08	1A	80	80	00	FF	FC	01	0C	FD	00
FAC 16								**FAC 17**					
RC-W	GC-W	BC-W	GD-W	BD-W	YUVGC	YUVBC	YUVRC	D-COL	D-BRI	D-CON	D-SHP		
00	01	05	FB	EE	FF	02	00	26	2D	64	5A		
FAC 18				**FAC 19**									
S-COL	S-BRI	S-CON	S-SHP	M-COL	M-BRI	M-CON	M-SHP						
1C	28	49	49	1E	2E	52	50						
FAC 20													
SEG-POINT1	SEG-POINT2	DATA-VL	DATA-VH	DATA-UF	SPE-POS1	SPE-DATA1	SENSI-ON	SENSI-OFF					
173	407	01	02	08	06	05	00	00					
FAC 21					**FAC 22**								
T-Hz120 -BAS	T-Hz500 -TRE	T-Hz1K5	T-Hz5K	T-Hz10K	C-Hz120-BAS	C-Hz500 -TRE	C-Hz1K5	C-Hz1K	C-Hz10K				
28	50	0C	0C	0C	3C	3E	0C	0C	0C				
FAC 23					**FAC 24**								
B-Hz120-BAS	B-Hz500-TRE	B-Hz1K5	B-Hz5K	B-Hz10K	COMB1	COMB2	COMB3	AV GAIN	OPTM3				
19	2B	0C	0C	0C	00	05	00	46	00				
FAC 25													
VOLMAX	CURTCEN	GATE	VOL-OUT	COLC-CVI	COLX-CVI	COLN-CVI	SDET-TIMER						
32	A5	2A	73	1E	20	00	04						

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

9.1 Brief Introduction of the Chassis

9.1.1 Chassis block diagram

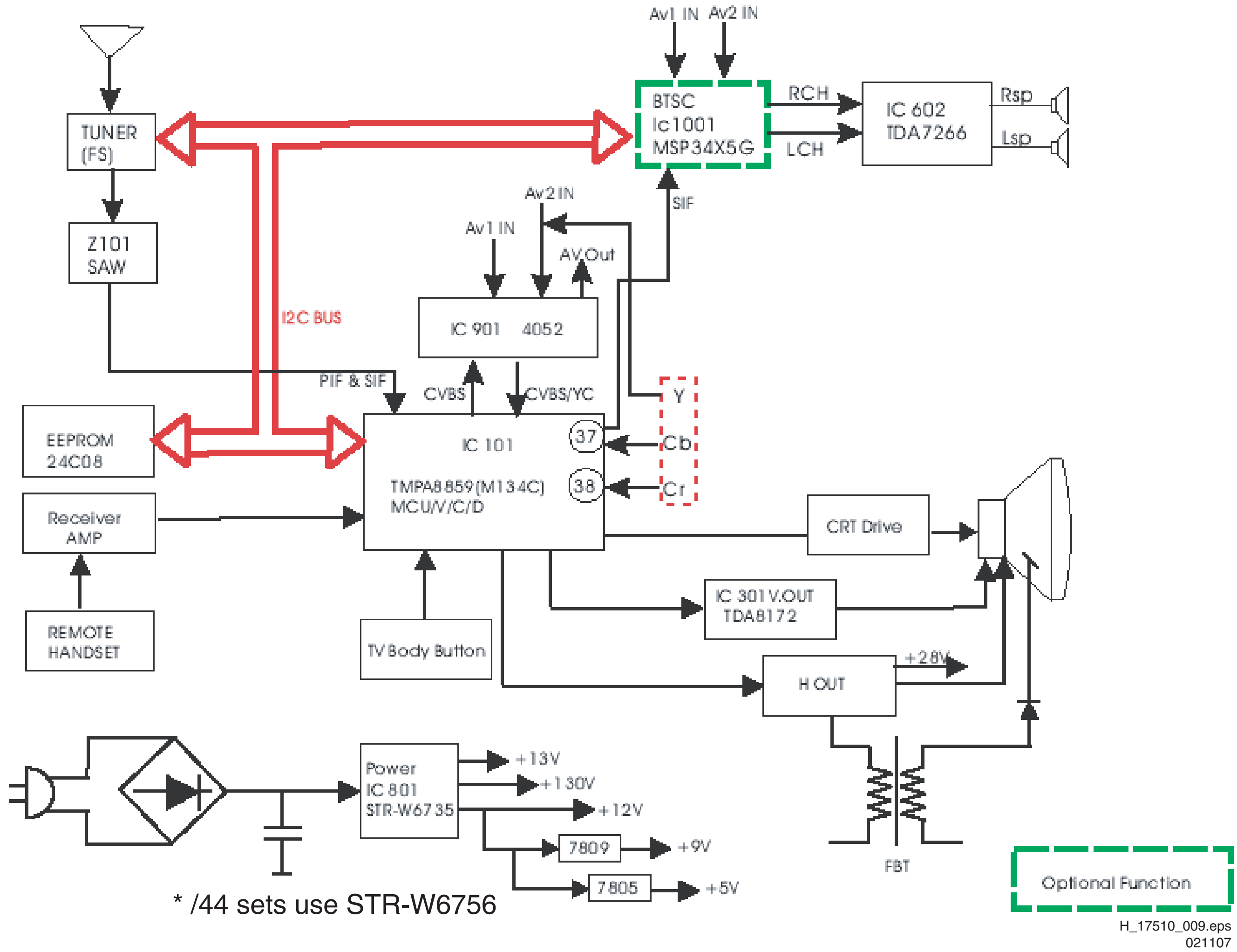


Figure 9-1 Chassis block diagram

9.1.2 Power Supply Section

This section mainly consists of

- IC STR-W6735 (/44 sets use STR-W6756) (IC801).
- Transformer (T803).
- Bridge rectifier (DB801).
- Accessory circuits.

The supply voltage for this chassis should be AC 110V. The allowed voltage range is 90V to 140V, the frequency range is 50/60Hz.

The AC power with high/low frequency interference goes through an RC filter, consisting of C801, T801, C802, R801, and T802. The filter removes the high/low frequency interference. Then DB801 transforms the AC power to DC power. T803 and IC 801 work in standby state. T803 will provide a power voltage to IC101. IC101 scans for the "KEY IN" signal (Pin 3 of IC101) from the ON/OFF switch on the keyboard. If "KEY IN" = "power on" signal, pin 64 (IC101) will generate a signal to drive the photo coupler (IC8021). It acts as a feed back circuit (feed back to Pin 6 of IC801) for controlling IC801 to adjust MOSFET.

Transformer T803 provides the following voltages:

- +13V voltage from Pin16.
- +130V (B+) voltage from Pin1.
- +12V from Pin 15.
- Pin 15 is also connected to two Positive Voltage Regulators (IC201, IC202) in-series. The outputs of these regulators are +9V and +5V respectively.

The picture below shows IC201 and IC202:

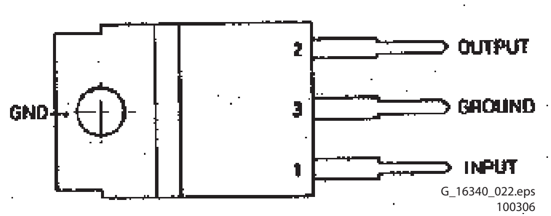


Figure 9-2 IC 201/202

9.1.3 Tuning Section

This section mainly consists of the tuner (TU101), the IF pre-amplifier circuit and the SAWFILTER.

Table 9-1 Tuning section 1

Pin	Symbol	Description
1	AGC	Auto gain control
2	AS	I2C bus address select
3	SCL	I2C bus serial clock
4	SDA	I2C bus serial data
5		
6	BP	Supply voltage tuner section +5V
7	BT	Supply voltage tuning section +31V
8	IF	Intermediate frequency out

Table 9-2 Short specification of the tuner

Receiving Channel	VHF LOW BAND: CH2~B(55.25~127.25MHz) VHF HIGH BAND: CH C~CH W+11(133.25~361.25MHz) CH W+12~69(367.25~801.25MHz)
Receiving System	NTSC
Intermediate Frequency	Picture carrier: 47.74MHz Colour carrier: 42.17MHz Sound carrier: 41.25MHz
Antenna Input Impedance	Unbalanced 75Ohms
Output Impedance	Unbalanced 75Ohms
Band change-over system	Digital change by PLL IC

From Pin58 of IC101 the I2C bus clock signal goes to the tuner. The tuner works during the clock time. IC101 will send out a data signal from Pin57 to control the tuner's working state by controlling the +33V voltage. +33V is provided from Pin10 of T803. That voltage is put into the tuner at Pin7. A circuit inside the tuner transforms +33V into a voltage between 0 and +33V (as a function of the data, sent by IC101).
The AGC signal is a close loop control voltage that keeps the amplitude of the signal constant.
Output of tuner is the Intermediate Frequency signal (IF signal). The IF signal will pass pre-amplifier circuit (refer to the picture below). The amplified IF signal passes the SAW filter and is then sent to IC101 Pin41/42.
IC101 creates a CVBS signal and sends it out from Pin30. CVBS will be selected by IC901, and then pass from Pin13 of IC901 to Pin20/24 if IC101. IC101 will demodulate the CVBS signal into an R, G, B signal. Next IC101 will send this R, G, B signal from Pin50/51/52 to the CRT board.

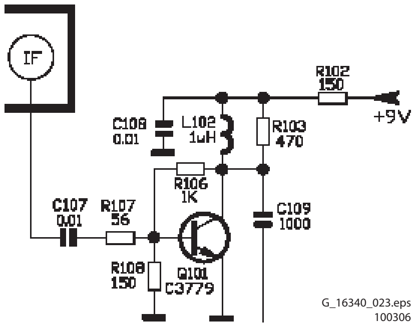


Figure 9-3 Pre-amplifier circuit

9.1.4 Sound Process Section

The SIF signal is sent out together with the TV signal from Pin30 of IC101. It passes through Q203, R225. X202 and a High-pass filter (consisting of C254, L206, C253) filters out the video signal and low frequency interference.

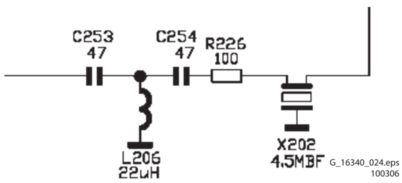


Figure 9-4 Sound process section 1

SIF will be finally sent into Pin2 of IC1001. An analog automatic gain control circuit (AGC) allows a wide range of input levels. The analog-to-digital conversion of the IF sound signal is done by an A/D-converter. The high pass filter, formed by a coupling capacitor at SIF_IN1+ suppresses video components.
IC1001 is controlled via the I2C bus slave interface.
The AV sound signal will be directly sent to Pin37/38 or Pin40/41 of IC1001. Q901/2 and Q903/4 form Emitter-Follower circuits to provide a better load ability.
The (analog) sound signal will go from Pin26/27 of IC1001 to Pin4/12 of IC602. IC602 is a dual bridge amplifier. The output voltage of IC602 drives the speakers. The volume is adjusted via the I2C bus.

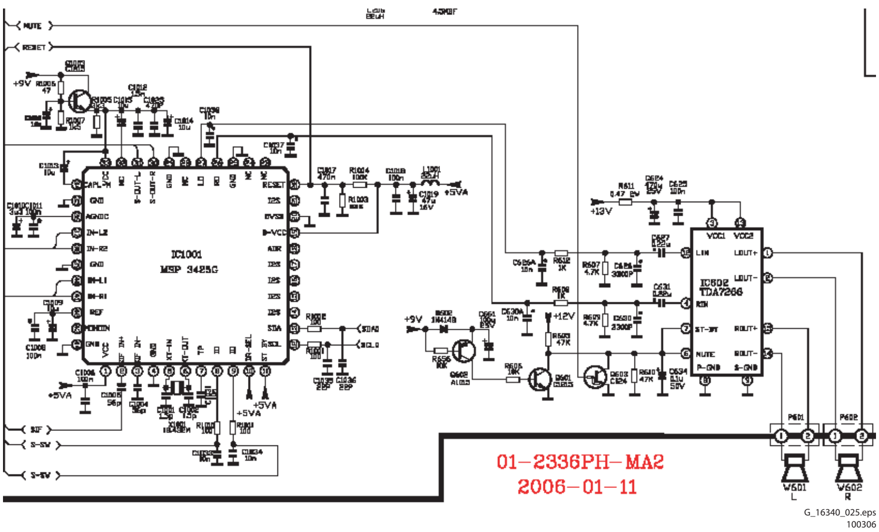


Figure 9-5 Sound process section 2

9.1.5 Vertical Output Section

This section mainly consists of IC301 (TDA8172), the Vertical Coil and the related circuit. The supply voltage of IC301 are +14V and -14V. These two voltages are provided by the LOT section. For the vertical scan, IC101 creates a Saw-tooth waveform at Pin16. This is the input signal of IC301. The main task of IC101 is to create the vertical scan waveform. The output signal of IC301 drives the Vertical Coil. If IC301 works in normal state, Pin6 will send a square-signal to maintain a high voltage at D214. If it does not, D214 will get a low voltage, Pin2 of IC101 senses this change and IC101 sends out a standby signal.

9.1.6 Horizontal Output and LOT Section

The horizontal drive pulse is a square wave. IC101 creates this waveform at Pin13. Via Q401 the signal goes to the input of Q411. Q411 is a horizontal output triode with a damper inside. The signal from Pin C of Q411 drives the Horizontal Coil. When Q411 goes into cut-off state, a sub-coil inside the LOT will generate an EHT by inductance.

9.2 IC description

9.2.1 Main IC (IC101)

Description:

The main IC is a TMPA8857CSNG, provided by TOSHIBA. It is an integrated circuit, suited for PAL, NTSC and SECAM TV. An MCU and a TV signal processor are integrated in a 64 pin DIP package.

The MCU contains an 8-bit CPU, ROM, RAM, I/O-ports, timer/counters, A/D-converters, an on-screen display controller, remote control interfaces, IIC bus interfaces, and the closed caption decoder.

The TV signal processor contains PIF, SIF, Video, multi-standard chroma, deflection, and RGB processors.

Features:

MCU:
- High speed 8-bit CPU
- 12 I/O ports
- I2C bus interface (multi-master)
- 14-bit PWM output, 1 channel, for a voltage synthesizer
- 7-bit PWM output, 1 channel
- 8-bit A/D converter, 3 channels
- Remote control signal preprocessor
- Two 16-bit internal timer/counters, 2 channels
- Two 8-bit internal timer/counters, 2 channels
- Time base timer
- Watchdog timer
- 16 interrupt sources: 5 external, 11 internal
- Stop and Idle power saving modes

CCD decoder
- Digital data slicer for NTSC

OSD
- Clock generation for OSD display
- Font ROM characters: 384 characters
- Characters display: 32 columns x 12 lines
- Composition: 16 x 18 dots
- Size of character: 3 (line by line)
- Color of character: 8 (character by character)
- Display position: H 256 / V 512 steps
- BOX function
- Fringing, smoothing, italic, underline function
- Conform to CCD regulation
- Jitter elimination

TV Processor

IF
- Integrated PIF VCO, aligned automatically
- Negative demodulation PIF
- Multi-frequency SIF demodulator, without external tank-coil

Video
- Integrated chroma traps
- Black stretch
- Y-gamma

Chroma
- Integrated chroma BPF's
- PAL/NTSC/SECAM demodulation

RGB/Base-band
- Integrated 1 H base-band delay line
- Base-band TINT control
- Internal OSD interface
- Half-tone and transparent for OSD
- External YCbCr interface for DVD
- RGB cut-off/drive controls by bus
- ABCL (ABL and ACL combined)

Synchronization
- Integrated fH x 640 VCO
- DC coupled vertical ramp output (single)
- EW correction with EHT output
- Sync out

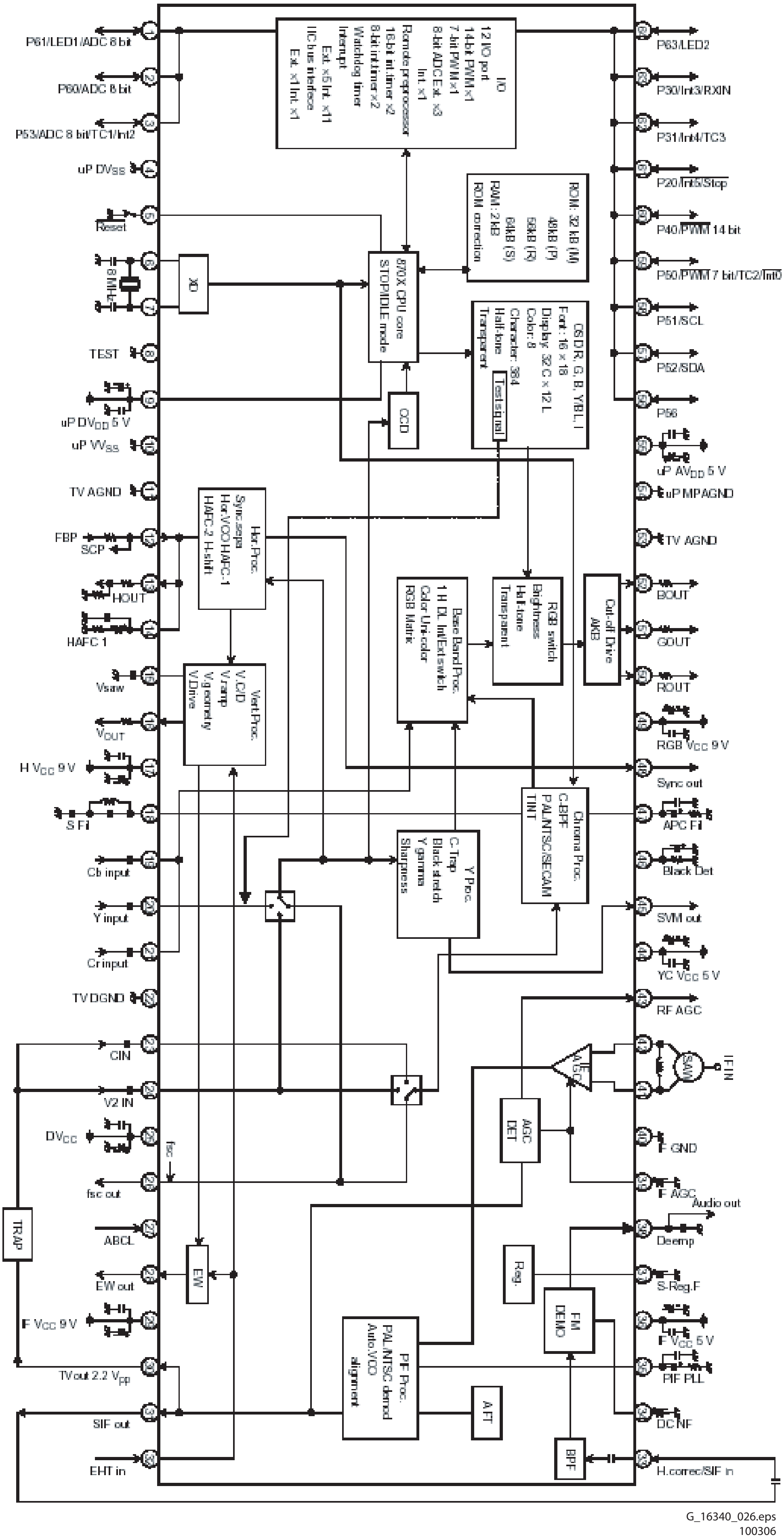


Figure 9-6 Block Diagram Main IC 1

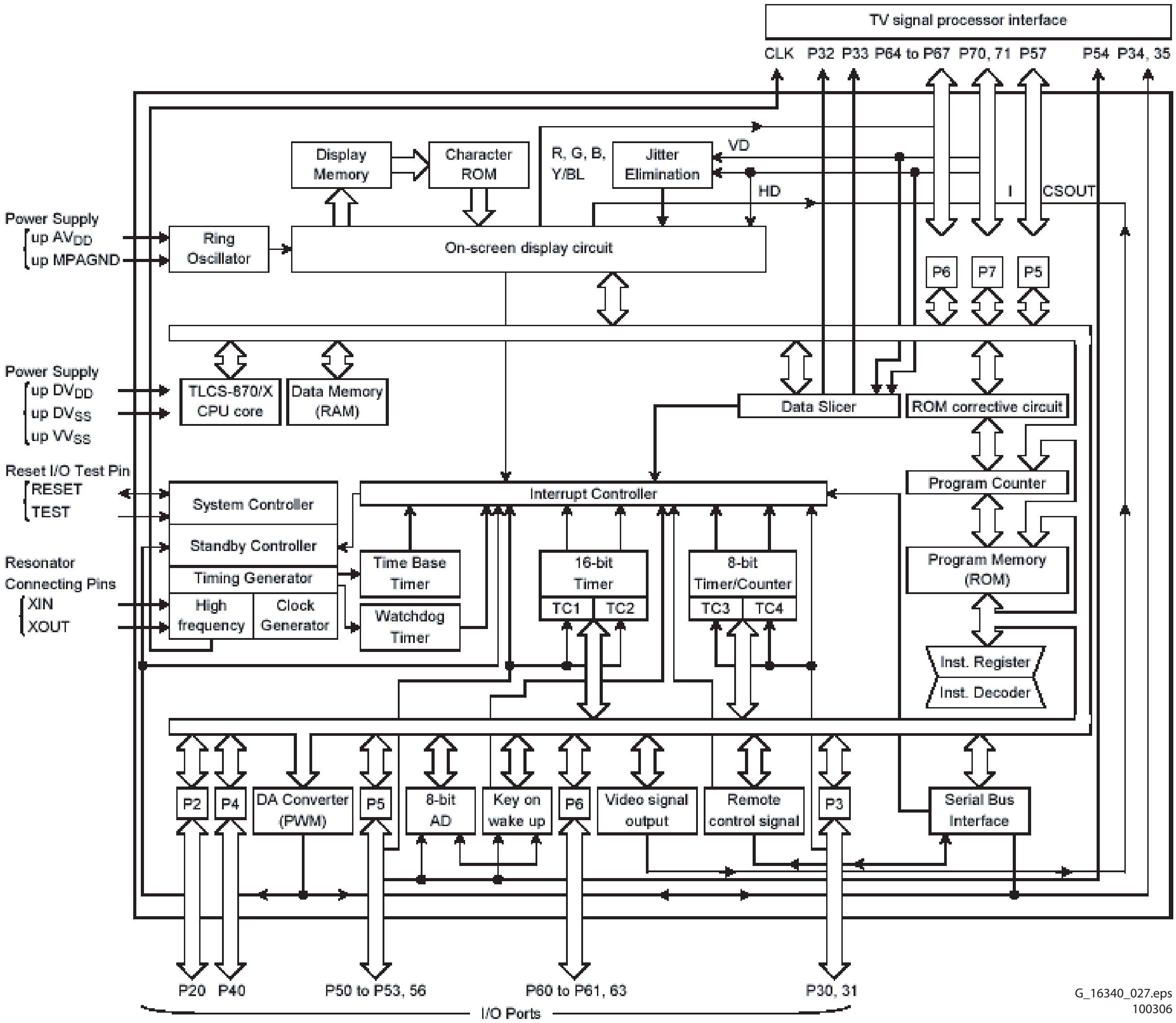


Figure 9-7 Block Diagram Main IC 2

9.2.2 Vertical Deflection Booster (IC 301)

The STV8172A is a vertical deflection booster, designed for TV and monitor applications.
This device, supplied with up to 35 V, provides a maximum output current of 2.5 A, to drive the vertical deflection yoke.
The internal fly back generator delivers fallback voltages of up to 75 V.

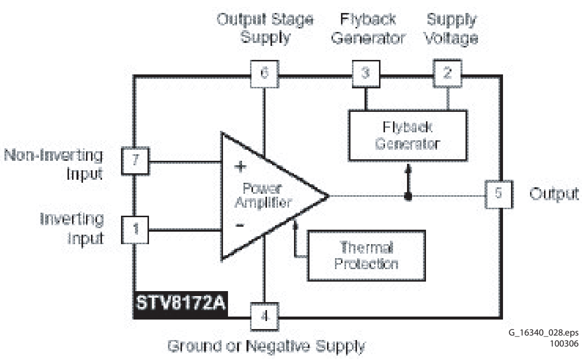


Figure 9-8 Vertical Deflection Booster

9.2.3 Demultiplexer (IC 901)

The HCF4052B is a monolithic integrated circuit, fabricated in Metal Oxide Semiconductor technology, available in DIP and SOP packages.
The HCF4052B analog multiplexer/demultiplexer is a digitally controlled analog switch, having low ON impedance, and very low OFF leakage current. This multiplexer circuit dissipates extremely low quiescent power over the full supply voltage range, independent of the logic states of the control signals. When a logic "1" is present at the inhibit input, all channels are off. This device is a differential 4-channel multiplexer, having 2 binary control inputs, A and B, and an inhibit input. The two binary input signals select 1 of 4 pairs of channels to be turned on and connect the analog inputs to the outputs.

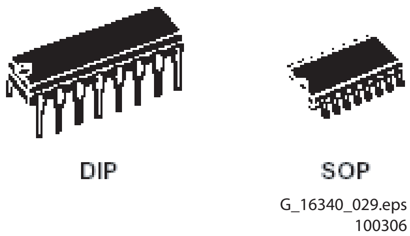


Figure 9-9 Demultiplexer

Table 9-3 Demultiplexer

PIN	Symbol
1 and 2	Y CHANNELS IN/OUT
3	COMMON "Y" OUT/IN
4 and 5	Y CHANNELS IN/OUT
6	INH
7	VEE
8	VSS
9	B
10	A
11 and 12	X CHANNELS IN/OUT
13	COMMON "X" OUT/IN
14 and 15	X CHANNELS IN/OUT
16	VDD

9.2.4 Sound Processor (IC1001)

Table 9-4 Sound Processor

Pin No.	Pin Name	Type	Short Description
1	AVSUP		Analog power supply +5V
2	ANA_IN+	IN	IF Input 1
3	ANA_IN-	IN	IF common
4	TESTEN	IN	Test pin
5	XTAL_IN	IN	Crystal oscillator
6	XTAL_OUT	OUT	Crystal oscillator
7	TP		Test pin
8	D_CTR_I/O_1	IN/OUT	D_CTR_I/O_1
9	D_CTR_I/O_0	IN/OUT	D_CTR_I/O_0
10	ADR_SEL	IN	I2C BUS address select
11	STANDBYQ	IN	Stand-by (Low-active)
12	I2C_CL	IN/OUT	I2C clock
13	I2C_DA	IN/OUT	I2C data
14	I2S_CL		I2S clock
15	I2S_WS		I2S word strobe
16	I2S_DA_OUT		I2S data output
17	I2S_DA_IN1		I2S1 data input
18	ADR_CL		ADR clock
19	DVSUP		Digital power supply +5 V
20	DVSS		Digital ground
21	I2S_DA_IN2		I2S2 data input
22	RESETQ	IN	Power-on-reset
23	NC		Not connected
24	NC		Not connected
25	VREF2		Reference ground 2 High-voltage part
26	DACM_R	OUT	Loudspeaker out, right
27	DACM_L	OUT	Loudspeaker out, left
28	NC		Not connected
29	VREF1		Reference Ground 1 High voltage part
30	SC1_OUT_R	OUT	Audio 1 output, right
31	SC1_OUT_L	OUT	Audio 1 output, left
32	NC		Not connected
33	AHVSUP		Analog power supply 8.0V
34	CAPL_M		Volume capacitor MAIN
35	AHVSS		Analog ground
36	AGNDC		Analog reference voltage High-voltage part
37	SC2_IN_L	IN	Audio 2 input, left
38	SC2_IN_R	IN	Audio 2 input, right
39	ASG		Analog shield Ground
40	SC1_IN_L	IN	Audio 1 input, left
41	SC1_IN_R	IN	Audio 1 input, right
42	VREFTOP		Reference voltage IF A/D converter
43	MONO_IN	IN	Mono input
44	AVSS		Analog ground

9.2.5 Dual Bridge Amplifier (IC 602)

The TDA7266SA is a dual bridge amplifier, specially designed for LCD monitor, PC motherboard, TV, and portable radio applications.

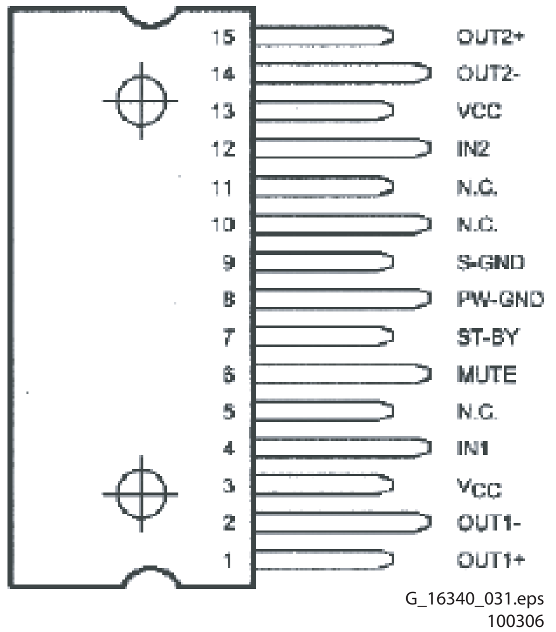


Figure 9-10 Dual Bridge Amplifier

10. Spare Parts List

Set Level

Various

CRT	9965 100 08481	A68ERF185X013/MR
CRT	9965 100 08550	A68ERF185X013/ME
OTH021	9965 200 32564	CHASSIS MAINBOARD
OTH022	9965 200 32565	CRT assy
OTH051	9965 200 32330	Connector
OTH091	9965 200 32559	SP/LA assy
OTH093	9965 200 32557	Sound Process assy
OTH100	9965 200 32559	SP/LA assy
P911	9965 100 08478	TJC3-7Y/SCN-7Y

Main Board

Various

F801	9965 000 34538	GLASS TUBE FUSE
F801	9965 100 08475	FUSE T 3.15A 250V
FCONTR	9965 200 32574	IR & Control assy
FORD811	9965 000 14925	Bead BF60 for C508
P201	9965 000 34463	HS 5p TJC3-5Y
P202	9965 200 32330	Connector
P421	9965 000 34512	HS 4P24 550 TJC3-4Y
SOUND	9965 200 32557	BTSC Assy
TU101	9965 000 34483	FSNA05T-4-E
X001	9965 000 15136	Xtal 8.0MHz
X201	9965 000 15710	CER TRAP TPS 4.5MHZ
X202	9965 000 34511	CER.FILTER LT4.5MH
Z101	9965 000 22820	SAW FILTER F1859

⊣⊢

C008	9965 000 34503	100pF 5% 50V
C01	9965 000 14036	100µF 20% 25V
C021	9965 000 27860	10µF /-20% 16V
C022	9965 100 07896	10nF 20% 50V
C025	9965 000 27860	10µF /-20% 16V
C026	9965 100 07896	10nF 20% 50V
C027	9965 100 07896	10nF 20% 50V
C028	9965 000 27860	10µF /-20% 16V
C029	9965 100 07896	10nF 20% 50V
C030	9965 000 31455	220pF 5% 50V
C031	9965 000 34506	39pF 5% 50V
C032	9965 000 34506	39pF 5% 50V
C033	9965 000 27860	10µF /-20% 16V
C034	9965 100 07896	10nF 20% 50V
C041	9965 000 27860	10µF /-20% 16V
C043	9965 100 07896	10nF 20% 50V
C101	9965 000 14039	4.7µF 20% 50V
C104	9965 000 15112	0.1µF 5% 50V
C105	9965 000 15686	100µF 20% 50V
C106	9965 100 07896	10nF 20% 50V
C107	9965 100 07896	10nF 20% 50V
C108	9965 100 07896	10nF 20% 50V
C109	9965 000 30711	1000pF 20% 50V
C209	9965 000 27860	10µF /-20% 16V
C210	9965 000 27871	33µF 20% 16V
C211	9965 000 15112	0.1µF 5% 50V
C212	9965 000 15057	4.7k 5% 0.16W
C213	9965 000 13961	47µF 20% 16V
C214	9965 100 07896	10nF 20% 50V
C216	9965 000 34500	0.22µF 10% 50V
C217	9965 000 30713	2.2nF 10% 50V
C218	9965 000 14037	1µF 20% 50V
C219	9965 000 14069	100µF 20% 16V
C220	9965 100 07896	10nF 20% 50V
C221	9965 000 14037	1µF 20% 50V
C223	9965 000 14039	4.7µF 20% 50V
C224	9965 000 14036	100µF 20% 25V
C225	9965 100 07896	10nF 20% 50V
C226	9965 000 30711	1000pF 20% 50V
C227	9965 000 15088	0.47µF 20% 50V
C228	9965 000 27860	10µF /-20% 16V
C229	9965 000 13961	47µF 20% 16V
C230	9965 000 15806	0.1µF +80-20% 50V
C231	9965 000 30713	2.2nF 10% 50V
C233	9965 000 14069	100µF 20% 16V
C234	9965 100 07896	10nF 20% 50V
C235	9965 000 27871	33µF 20% 16V
C236	9965 100 07896	10nF 20% 50V
C237	9965 000 14075	10µF 20% 50V
C238	9965 000 15112	0.1µF 5% 50V
C239	9965 100 07896	10nF 20% 50V
C241	9965 000 14037	1µF 20% 50V
C242	9965 000 15112	0.1µF 5% 50V
C243	9965 000 14037	1µF 20% 50V
C244	9965 100 07896	10nF 20% 50V
C245	9965 000 14599	470µF 20% 16V
C246	9965 000 34501	0.47µF 10%
C247	9965 000 17886	0.0082µF 5% 63V
C248	9965 000 34501	0.47µF 10%
C249	9965 000 14039	4.7µF 20% 50V
C250	9965 000 15182	47µF 20% 25V
C251	9965 000 14039	4.7µF 20% 50V
C254	9965 000 34507	47pF 5% 50V
C261	9965 100 07896	10nF 20% 50V
C262	9965 000 14070	220µF 20% 16V
C263	9965 000 14069	100µF 20% 16V
C264	9965 000 15112	0.1µF 5% 50V
C266	9965 000 15112	0.1µF 5% 50V
C280	9965 100 07896	10nF 20% 50V
C281	9965 100 07896	10nF 20% 50V
C301	9965 000 15684	220µF 20% 35V
C302	9965 000 14598	100µF 20% 35V
C303	9965 000 14075	10µF 20% 50V
C304	9965 000 15114	0.47µF 5% 50V
C305	9965 000 34509	0.68µF 5% 63V
C306	9965 000 34508	6800pF 10% 50V
C308	9965 000 15684	220µF 20% 35V
C309	9965 000 22941	0.33µF 63V 5% MPE
C311	9965 000 15697	2700pF 5% 100V
C315	9965 000 34502	68pF 5% 50V
C401	9965 000 22930	4.7µF 20% 160V
C402	9965 000 34505	3300pF 50V 10%
C403	9965 000 34461	390pF 5% 50V
C413	9965 100 08472	0.012µF 5% 400V
C415	9965 000 15682	Electrolytic Capacitor
C422	9965 000 34497	220µF 160V 20%
C431	9965 000 31455	220pF 5% 50V
C432	9965 000 34499	1000µF 20% 35V
C433	9965 000 15183	220pF 500V 10%
C435	9965 000 34499	1000µF 20% 35V
C441	9965 000 15183	220pF 500V 10%
C442	9965 000 34498	22µF 250V /-20%
C443	9965 000 14039	4.7µF 20% 50V
C451	9965 000 15700	0.056µF 5% 400V
C622	9965 000 15103	22pF 5% 50V
C623	9965 000 15103	22pF 5% 50V
C624	9965 000 14071	470µF 20% 25V
C625	9965 000 15112	0.1µF 5% 50V
C626	9965 000 34475	33µF 5% 63V
C627	9965 000 15113	220nF 5% 50V
C630	9965 000 34475	33µF 5% 63V
C631	9965 000 15113	220nF 5% 50V
C634	9965 000 34474	33µF 20% 50V
C661	9965 000 14036	100µF 20% 25V
C801	9965 000 35331	0.22µF 20% 250V
C802	9965 000 35331	0.22µF 20% 250V
C803	9965 000 24382	0.1µF 10% 400V
C804	9965 000 15188	4700pF 250Vac +80-20%
C804B	9965 000 17914	470pF 10% 400V
C805	9965 000 15188	4700pF 250Vac +80-20%
C805B	9965 000 17914	470pF 10% 400V
C806	9965 000 40946	220µF 20% 450V
C806	9965 100 07880	CAP.ELEC 200V 680UF
C807	9965 000 44381	10nF 10% 500V
C810	9965 000 31455	220pF 5% 50V
C811	9965 000 15719	3.3µF 20% 50V
C812	9965 000 30711	1000pF 20% 50V
C812	9965 000 34505	3300pF 50V 10%
C813	9965 000 15806	0.1µF +80-20% 50V
C814	9965 000 17906	10µF 20% 35V
C815	9965 000 38780	1000pF 10% 2KV
C815	9965 000 38974	1000pF 102KV
C816	9965 000 44728	10nF 20% 1kV
C817	9965 000 44729	220pF 10% 1kV
C820	9965 000 15183	220pF 500V 10%
C821	9965 000 22932	1000µF 20% 25V
C822	9965 100 07896	10nF 20% 50V
C826	9965 100 07882	470pF 10% 2KV
C827	9965 000 44381	10nF 10% 500V
C828	9965 100 07881	330µF 20%160V
C829	9965 000 14075	10µF 20% 50V
C831	9965 100 07896	10nF 20% 50V
C832	9965 000 17510	1000µF 16V 20%
C833	9965 000 34533	4700ΩF 16V 20%
C834	9965 100 07896	10nF 20% 50V
C835	9965 100 07896	10nF 20% 50V
C836	9965 000 14599	470µF 20% 16V
C840B	9965 100 03195	2200pF 20% 400VAC
C903	9965 000 13961	47µF 20% 16V
C904	9965 000 27860	10µF /-20% 16V
C905	9965 000 27860	10µF /-20% 16V
C908	9965 000 13961	47µF 20% 16V
C909	9965 000 27860	10µF /-20% 16V
C910	9965 000 27860	10µF /-20% 16V
C911	9965 100 07896	10nF 20% 50V
C912	9965 000 14069	100µF 20% 16V
C913	9965 100 07896	10nF 20% 50V
C914	9965 000 14069	100µF 20% 16V
C924	9965 000 27860	10µF /-20% 16V
C925	9965 000 34504	33pF 50V /-5%
C926	9965 000 14070	220µF 20% 16V
C927	9965 000 27860	10µF /-20% 16V
C928	9965 000 27860	10µF /-20% 16V
C929	9965 100 07896	10nF 20% 50V
C930	9965 000 14069	100µF 20% 16V

-WW-

R001	9965 000 14050	10k 5% 0.16W
R003	9965 100 02999	1kΩ 5% 1/6W
R004	9965 100 02999	1kΩ 5% 1/6W
R005	9965 000 15057	4.7k 5% 0.16W
R006	9965 000 15057	4.7k 5% 0.16W
R01	9965 000 15057	4.7k 5% 0.16W
R018	9965 000 14050	10k 5% 0.16W
R02	9965 000 27858	27kΩ 5% 1/6W
R023	9965 000 14049	100Ω 5% 0.16W
R024	9965 100 03127	47Ω 5% 1/6W
R025	9965 000 14050	10k 5% 0.16W
R026	9965 000 14050	10k 5% 0.16W
R030	9965 000 15773	4.7Ω 5% 0.25W
R031	9965 100 02999	1kΩ 5% 1/6W
R032	9965 100 02999	1kΩ 5% 1/6W
R033	9965 100 02999	1kΩ 5% 1/6W
R034	9965 000 14050	10k 5% 0.16W
R036	9965 000 13960	470Ω 5% 0.16W
R036A	9965 000 14050	10k 5% 0.16W
R043	9965 000 14050	10k 5% 0.16W
R044	9965 000 13957	2.2kΩ 5% 1/6W
R101	9965 000 14049	100Ω 5% 0.16W
R101A	9965 000 14049	100Ω 5% 0.16W
R102	9965 100 03110	150Ω 5% 1/6W
R103	9965 000 13960	470Ω 5% 0.16W
R104	9965 000 15047	22Ω 5% 1/6W
R106	9965 100 03000	680Ω 5% 1/6W
R107	9965 100 03140	56Ω 5% 1/6W
R108	9965 100 03110	150Ω 5% 1/6W
R209	9965 000 14050	10k 5% 0.16W
R211	9965 000 15057	4.7k 5% 0.16W
R212	9965 100 02996	1N4148 (Switching)
R213	9965 000 14050	10k 5% 0.16W
R214	9965 000 15050	270Ω 5% 0.16W
R215	9965 000 15050	270Ω 5% 0.16W
R216	9965 000 15050	270Ω 5% 0.16W
R219	9965 100 03123	30kΩ 5% 1/6W
R220	9965 100 03120	220kΩ 5% 1/6W
R222	9965 000 15041	100k 5% 0.16W
R223	9965 000 15041	100k 5% 0.16W
R225	9965 000 13959	330Ω 5% 1/6W
R226	9965 000 14049	100Ω 5% 0.16W
R227	9965 000 15050	270Ω 5% 0.16W
R228	9965 000 14050	10k 5% 0.16W
R229	9965 000 15049	24kΩ 5% 1/6W
R230	9965 000 15049	24kΩ 5% 1/6W
R231	9965 000 14055	33kΩ 5% 1/6W
R232	9965 000 14049	100Ω 5% 0.16W
R233	9965 000 13959	330Ω 5% 1/6W
R233A	9965 000 31774	3.3kΩ 5% 0.16W
R234	9965 000 14049	100Ω 5% 0.16W
R235	9965 000 17494	120Ω 5% 1/6W
R238	9965 000 13960	470Ω 5% 0.16W
R239	9965 100 02999	1kΩ 5% 1/6W
R241	9965 000 15050	270Ω 5% 0.16W
R242	9965 000 14049	100Ω 5% 0.16W
R243	9965 000 14049	100Ω 5% 0.16W
R244	9965 100 03090	BAT85 (Switch.)
R245	9965 000 14049	100Ω 5% 0.16W
R246	9965 100 03146	8.2kΩ 5% 1/6W
R247	9965 000 13959	330Ω 5% 1/6W
R248	9965 100 02999	1kΩ 5% 1/6W
R250	9965 100 07901	180Ω 5% 1/6W
R251	9965 000 13960	470Ω 5% 0.16W
R253	9965 000 15041	100k 5% 0.16W
R254	9965 000 15041	100k 5% 0.16W
R255	9965 000 31773	150W 5% 0.16W
R256	9965 100 06101	5.6kΩ 5% 1/6W
R257	9965 000 15057	4.7k 5% 0.16W
R258	9965 100 03110	150Ω 5% 1/6W
R261	9965 000 13959	330Ω 5% 1/6W
R262	9965 100 03107	1.2kΩ 5% 1/6W

R266	9965 000 15777	22kΩ 1% 2W
R302	9965 000 34492	3.9kΩ 1% 1/4W
R303	9965 000 34491	33kΩ 1% 1/4W
R304	9965 000 34494	0.68Ω 1W
R309	9965 100 07903	180Ω 5% 1W
R310	9965 000 14050	10kΩ 5% 0.16W
R311	9965 000 34489	10kΩ 1% 1/4W
R312	9965 000 34490	18kΩ 1% 1/4W
R313	9965 000 34495	1.5Ω 2W
R316	9965 000 34488	10kΩ 5% 1/2W
R401	9965 100 03114	220Ω 5% 1/6W
R402	9965 000 15676	2.4kΩ 5% 1W
R404	9965 000 34517	4.7kΩ 5% 7W
R412	9965 000 14054	2kΩ 5% 1/6W
R413	9965 000 14053	15kΩ 5% 1/6W
R414	9965 000 14585	47kΩ 5% 1/6W
R415	9965 000 15678	3.9Ω 5% 2W
R417	9965 000 13957	2.2kΩ 5% 1/6W
R418	9965 000 15057	4.7kΩ 5% 0.16W
R419	9965 100 07904	680Ω 5% 2W
R420	9965 000 13957	2.2kΩ 5% 1/6W
R420A	9965 000 13957	2.2kΩ 5% 1/6W
R422	9965 100 07878	0.47Ω 5% 2W
R423	9965 100 07878	0.47Ω 5% 2W
R424	9965 000 14050	10kΩ 5% 0.16W
R431	9965 100 07902	0.68Ω 5% 2W
R433	9965 100 07902	0.68Ω 5% 2W
R442	9965 100 07877	1Ω 5% 1/2W
R453	9965 100 02999	1kΩ 5% 1/6W
R460	9965 000 22907	150kΩ 5% 1/2W
R605	9965 000 14585	47kΩ 5% 1/6W
R605A	9965 000 17864	820Ω 5% 0.16W
R606	9965 000 14050	10kΩ 5% 0.16W
R608	9965 100 02999	1kΩ 5% 1/6W
R610	9965 000 14585	47kΩ 5% 1/6W
R611	9965 000 22999	0.47Ω 2W
R612	9965 100 02999	1kΩ 5% 1/6W
R618	9965 000 14050	10k 5% 0.16W
R656	9965 000 14050	10k 5% 0.16W
R801	9965 000 17901	1M 5% 0.5W
R810	9965 000 30822	68kΩ 5% 2W
R810	9965 100 08473	100kΩ 5% 2W
R811	9965 100 02999	1kΩ 5% 1/6W
R812	9965 100 02999	1kΩ 5% 1/6W
R813	9965 000 34528	15Ω 5% 1/2W
R814	9965 000 34526	1.5kΩ 5% 1/4W
R815	9965 000 14049	100Ω 5% 0.16W
R816	9965 000 34531	0.12Ω 2W Wire Wound
R816	9965 100 08474	0.15Ω 5% 2W
R817	9965 100 08476	100kΩ
R820	9965 000 34539	FUSE 5A 250VAC
R821	9965 000 34537	FUSE 3A 250VAC
R823A	9965 000 34537	FUSE 3A 250VAC
R825	9965 000 15664	2.2kΩ 5% 1/4W
R826	9965 000 34529	10Ω 5% 2W
R827	9965 000 34530	4.7kΩ 5% 5W
R828	9965 000 15777	22kΩ 5% 2W
R829	9965 000 14050	10k 5% 0.16W
R830	9965 100 02999	1kΩ 5% 1/6W
R831	9965 000 14055	33kΩ 5% 1/6W
R832	9965 000 14050	10kΩ 5% 0.16W
R833	9965 000 14050	10kΩ 5% 0.16W
R834	9965 000 34525	820kΩ 5%1/6W
R834A	9965 000 34527	6.8kΩ 1% 1/4W
R834B	9965 000 22797	390kΩ 1%1/4W
R835	9965 000 26502	0.12MΩ 1% 1/2W
R836	9965 000 15771	1KΩ 1/4W 5% Carb. Film
R837	9965 000 14050	10k 5% 0.16W
R838	9965 000 14050	10k 5% 0.16W
R840B	9965 000 17902	8.2M 5% 1W
R901	9965 100 03144	82Ω 5% 1/6W
R902	9965 100 03144	82Ω 5% 1/6W
R903	9965 000 31773	150W 5% 0.16W
R904	9965 100 02999	1kΩ 5% 1/6W
R905	9965 000 31773	150W 5% 0.16W
R906	9965 100 02999	1kΩ 5% 1/6W
R908	9965 100 03144	82Ω 5% 1/6W
R910	9965 100 02999	1kΩ 5% 1/6W
R911	9965 100 02999	1kΩ 5% 1/6W
R912	9965 100 02999	1kΩ 5% 1/6W
R913	9965 100 02999	1kΩ 5% 1/6W
R914	9965 100 03144	82Ω 5% 1/6W
R915	9965 100 03144	82Ω 5% 1/6W
R916	9965 100 02999	1kΩ 5% 1/6W
R917	9965 100 02999	1kΩ 5% 1/6W
R920	9965 000 14049	100Ω 5% 0.16W
R923	9965 100 03143	75Ω 5% 1/6W
R924	9965 100 02999	1kΩ 5% 1/6W
R925	9965 100 02999	1kΩ 5% 1/6W
R930	9965 100 03114	220Ω 5% 1/6W
R931	9965 100 03114	220Ω 5% 1/6W
R932	9965 100 02999	1kΩ 5% 1/6W
R932A	9965 100 02999	1kΩ 5% 1/6W
R933	9965 000 14053	15kΩ 5% 1/6W
R934	9965 100 02999	1kΩ 5% 1/6W
R934A	9965 100 02999	1kΩ 5% 1/6W
R935	9965 000 31773	150W 5% 0.16W
R936	9965 100 02999	1kΩ 5% 1/6W
R937	9965 000 14048	10Ω 5% 1/6W
R944	9965 000 14050	10k 5% 0.16W
R945	9965 000 14050	10k 5% 0.16W
R946	9965 100 03107	1.2kΩ 5% 1/6W
R946A	9965 000 13957	2.2kΩ 5% 1/6W
R947	9965 000 15041	100k 5% 0.16W
R948	9965 100 02999	1kΩ 5% 1/6W
R951	9965 000 31773	150W 5% 0.16W
R952	9965 000 31773	150W 5% 0.16W
R953	9965 000 31773	150W 5% 0.16W
R954	9965 000 31773	150W 5% 0.16W
RL01	9965 000 23783	Relay SS-112DM 12V
RT801	9965 000 27862	POSISTOR MZ75-9RM
RT802	9965 000 44720	NTC 2.5D-18LCS
VR802	9965 000 34532	TRIMMER B330 HORIZ TYPE

L001	9965 100 07874	Bead
L002	9965 000 15123	10μH 5%
L101	9965 000 24356	COIL PL - 47 UH +/-5%
L102	9965 000 15121	1μH 10%
L204	9965 000 15124	22μH 5%
L205	9965 000 15124	22μH 5%
L206	9965 000 15124	22μH 5%
L208	9965 000 15124	22μH 5%
L209	9965 000 15123	10μH 5%
L212	9965 000 15123	10μH 5%
L301	9965 000 22943	Bead
L413	9965 100 07876	COIL WIDTH 1 MH
L801	9965 000 15193	100μH 10%
L802	9965 100 07874	Bead
L803	9965 100 03165	Bead BF-I35050R-730
L804	9965 100 03165	Bead BF-I35050R-730
T401	9965 000 17887	Transf. Hor. Drive
T801	9965 000 34535	10μH LCL-2802B
T801	9965 000 44735	LGH2V-40μH
T802	9965 000 22946	Line Filter 20μH
T802	9965 000 34535	10μH LCL-2802B
T803	9965 000 34536	BCK-4201-78
T803	9965 100 08477	BCK-42-0300

D001	9965 000 15651	5V-5V2 1/2W
D01	9965 100 02996	1N4148 (Switching)
D02	9965 100 02996	1N4148 (Switching)
D101	9965 100 03098	DIODE CW574CD
D202	9965 100 02996	1N4148 (Switching)
D203	9965 100 02996	1N4148 (Switching)
D204	9965 100 02996	1N4148 (Switching)
D205	9965 100 02996	1N4148 (Switching)
D206	9965 100 02996	1N4148 (Switching)
D207	9965 000 15818	BZX79-C6V2
D208	9965 100 02996	1N4148 (Switching)
D209	9965 000 14045	2V4 1/2W 5%
D210	9965 100 07898	24V 1/2W 5%
D211	9965 100 02996	1N4148 (Switching)
D212	9965 100 02996	1N4148 (Switching)
D213	9965 000 15817	3V9 1/2W 5%
D214	9965 100 02996	1N4148 (Switching)
D215	9965 100 02996	1N4148 (Switching)
D262	9965 100 02996	1N4148 (Switching)
D301	9965 100 03094	1N4001 (Rectifier)
D303	9965 100 05977	8V2 1/2W 5%
D304	9965 100 03091	FR104 (Fast Rectifier)
D309	9965 000 34484	BZV85-C51 1.3W-51V
D310	9965 100 02996	1N4148 (Switching)
D410	9965 100 02996	1N4148 (Switching)
D411	9965 100 06104	BY228
D412	9965 100 03091	FR104 (Fast Rectifier)
D420	9965 100 03091	FR104 (Fast Rectifier)
D431	9965 100 03091	FR104 (Fast Rectifier)
D432	9965 100 03091	FR104 (Fast Rectifier)
D441	9965 100 03091	FR104 (Fast Rectifier)
D602	9965 000 31774	3.3kΩ 5% 0.16W
D810	9965 100 03091	FR104 (Fast Rectifier)
D811	9965 100 03091	FR104 (Fast Rectifier)
D812	9965 100 02996	1N4148 (Switching)
D813	9965 000 15818	BZX79-C6V2
D816	9965 000 20421	1H8
D820	9965 000 22883	RU4YX
D822	9965 000 34522	RU4AMS
D823	9965 000 25702	SR3100
D824	9965 100 03094	1N4001 (Rectifier)
D826	9965 100 05977	8V2 1/2W 5%
D827	9965 100 02996	1N4148 (Switching)
D828	9965 100 06119	BZX79B6V2 +/-2%
D829	9965 100 02996	1N4148 (Switching)
D834	9965 100 06107	9V1 1/2W 5%
DB801	9965 000 22884	D3SB60 Bridge Rect.

IC001	9965 000 17857	M24C08
IC101	9965 000 38193	TMPA8857PSNG
IC201	9965 000 34485	IC L7809 SGS (TO-220)
IC202	9965 100 03102	+5V 1.5A IC L7805CV
IC301	9965 000 30670	IC STV8172
IC602	9965 000 34473	IC TDA7266SA
IC801	9965 000 34524	STR-W6735
IC801	9965 100 08690	IC STR-W6756
IC802	9965 000 27867	PS2561L1-1-V
IC901	9965 000 15655	IC 4052
Q007	9965 100 03003	2SC1815-Y
Q008	9965 100 02997	ST2SA1015Y (PNP)
Q01	9965 000 34540	2SC2236-Y
Q101	9965 000 14974	2SC3779D
Q202	9965 100 03003	2SC1815-Y
Q203	9965 100 03003	2SC1815-Y
Q204	9965 100 03003	2SC1815-Y
Q205	9965 100 02997	ST2SA1015Y (PNP)
Q208	9965 100 07899	2SA817A-Y
Q209	9965 100 05966	PDTC124ES (NPN)
Q401	9965 100 02998	2SC2482
Q402	9965 100 03003	2SC1815-Y
Q411	9965 000 32929	NPN BU2520DX
Q412	9965 100 02997	ST2SA1015Y (PNP)
Q413	9965 100 02997	ST2SA1015Y (PNP)
Q414	9965 100 08471	IRFS630B
Q415	9965 100 03003	2SC1815-Y
Q601	9965 100 03003	2SC1815-Y
Q602	9965 100 02997	ST2SA1015Y (PNP)
Q603	9965 100 05966	PDTC124ES (NPN)
Q820	9965 000 34523	2SC2230Y
Q821	9965 000 15587	2SC4544
Q822	9965 100 03003	2SC1815-Y
Q823	9965 100 03003	2SC1815-Y
Q824	9965 100 03003	2SC1815-Y
Q825	9965 100 03003	2SC1815-Y
Q901	9965 100 03003	2SC1815-Y
Q902	9965 100 03003	2SC1815-Y
Q903	9965 100 03003	2SC1815-Y
Q904	9965 100 03003	2SC1815-Y
Q911	9965 100 03003	2SC1815-Y
Q912	9965 100 02997	ST2SA1015Y (PNP)
Q917	9965 100 03003	2SC1815-Y
Q918	9965 100 05966	PDTC124ES (NPN)
Q919	9965 100 05966	PDTC124ES (NPN)
J215	9965 000 14050	10k 5% 0.16W
J310	9965 100 02996	1N4148 (Switching)
J603	9965 000 34510	2.2μH 10%
J604	9965 000 34510	2.2μH 10%
J806	9965 100 07874	Bead

CRT Panel

Various

S501	9965 000 34422	CRT Sock. GZS10-2-108

C411	9965 000 34427	0.0039μF 5% 1.6kV
C412	9965 100 08483	0.0063μF 5% 1.6kV
C414	9965 100 08483	0.0063μF 5% 1.6kV
C419	9965 100 07895	0.33μF 5% 400V
C501	9965 000 34461	390pF 5% 50V
C502	9965 000 31199	470pF 5% 50V
C503	9965 000 31199	470pF 5% 50V
C504	9965 000 14921	10μF 20% 250V
C505	9965 000 44382	1000pF 10% 2kV
C506	9965 000 14599	470μF 20% 16V
C508	9965 000 14925	Bead BF60 for C508
C508	9965 100 07896	10nF 20% 50V
C509	9965 100 07896	10nF 20% 50V

R416	9965 000 15057	4.7k 5% 0.16W
R432	9965 100 03146	8.2kΩ 5% 1/6W
R461	9965 100 08482	10kΩ 5% 1/2W
R461	9965 100 08549	10kΩ 5% 1/2W
R461A	9965 100 08482	10kΩ 5% 1/2W
R461A	9965 100 08549	10kΩ 5% 1/2W
R501	9965 100 05971	560 Ohm 5% 1/6W
R502	9965 100 03000	680Ω 5% 1/6W

R503	9965 100 03000	680Ω 5% 1/6W
R505	9965 100 05971	560Ω 5% 1/6W
R506	9965 100 03000	680Ω 5% 1/6W
R508	9965 100 03000	680Ω 5% 1/6W
R509	9965 100 03000	680Ω 5% 1/6W
R510	9965 100 05971	560Ω 5% 1/6W
R511	9965 100 03000	680Ω 5% 1/6W
R513	9965 100 03000	680Ω 5% 1/6W
R514	9965 100 03121	2.7kΩ 5% 1/6W
R515	9965 100 02999	1kΩ 5% 1/6W
R516	9965 000 15589	18kΩ 5% 1/2W
R517	9965 000 15589	18kΩ 5% 1/2W
R518	9965 000 15589	18kΩ 5% 1/2W
R519	9965 100 03001	2.7kΩ 5% 1/2W
R520	9965 100 03001	2.7kΩ 5% 1/2W
R521	9965 100 03001	2.7kΩ 5% 1/2W
R522	9965 100 03000	680Ω 5% 1/6W

L414	9965 100 08484	18μH
L501	9965 100 02996	1N4148 (Switching)
L503	9965 000 15411	10μH 10%
T402	9965 000 34428	FBT BSC27-0101Q

D501	9965 100 02996	1N4148 (Switching)
D502	9965 100 02996	1N4148 (Switching)

Q501	9965 000 15587	2SC4544
Q502	9965 100 03003	2SC1815-Y
Q503	9965 000 15587	2SC4544
Q504	9965 100 03003	2SC1815-Y
Q505	9965 000 15587	2SC4544
Q506	9965 100 03003	2SC1815-Y
Q507	9965 000 14915	2SA562TM-0
OTH106	9965 000 34424	HS 4p 500/13 TJC1-4Y
OTH117	9965 000 34424	HS 4p 500/13 TJC1-4Y

IR & Front Control Panel

Various

IR001A	9965 000 27288	IR Receiver Module
P001B	9965 100 07897	HS 5P 2468#24 400MM
P002A	9965 000 27970	PIN BASE VH-3AW
P002B	9965 000 33614	3PIN BASE
S001A	9965 000 17540	Switch
S002A	9965 000 17540	Switch
S003A	9965 000 17540	Switch
S004A	9965 000 17540	Switch
SW001	9965 100 08469	POWER SOCKET PS6

C070A	9965 000 13961	47μF 20% 16V
CORD	9965 100 08468	206 P0WER CORD

R025A	9965 000 24332	2.4Ω 5% 1/6W
R027A	9965 000 17896	3.6kΩ 5% 1/6W
R028A	9965 000 27858	27kΩ 5% 1/6W
R029A	9965 100 03146	8.2kΩ 5% 1/6W
R033B	9965 000 13960	470Ω 5% 0.16W
R070A	9965 100 03127	47Ω 5% 1/6W

D1001A	9965 000 32018	LED 932205099682
OTH023	9965 100 08467	HS 2P 1617#22 300

BTSC Panel

Various

X1001	9965 000 26861	18.432MHZ(CL=12PF)

C1001	9965 000 30782	3.3pF 50V
C1002	9965 000 30782	3.3pF 50V
C1004	9965 000 27330	56pF 5% 50V 0603
C1005	9965 000 27330	56pF 5% 50V 0603
C1006	9965 000 15112	0.1μF 5% 50V
C1008	9965 000 15112	0.1μF 5% 50V
C1009	9965 000 27860	10μF /-20% 16V
C1010	9965 000 15719	3.3μF 20% 50V
C1011	9965 000 15112	0.1μF 5% 50V
C1012	9965 000 20357	1000PF 50V 5% 0603
C1013	9965 000 27860	10μF /-20% 16V
C1014	9965 000 27860	10μF /-20% 16V
C1015	9965 000 27860	10μF /-20% 16V
C1016	9965 000 27860	10μF /-20% 16V
C1018	9965 000 20357	1000PF 50V 5% 0603
C1019	9965 000 20357	1000PF 50V 5% 0603
C1025	9965 000 14012	470pF 5% 50V 0603
C1031	9965 000 20344	10nF 50V +80-20% 0603
C1033	9965 000 20344	10nF 50V +80-20% 0603
C1034	9965 000 20344	10nF 50V +80-20% 0603
C1035	9965 000 14011	22pF 5% 50V
C1036	9965 000 14011	22pF 5% 50V
C1037	9965 000 15112	0.1μF 5% 50V
C1038	9965 000 13961	47μF 20% 16V
C1039	9965 000 15114	0.47μF 5% 50V
C1040	9965 000 20357	1000pF 50V 5% 0603
C1041	9965 000 20357	1000pF 50V 5% 0603
C1042	9965 000 15084	22μF 20% 16V
C1043	9965 000 14008	0.1uF 50V +80%~-20%
C1044	9965 000 20349	220pF 5% 50V 0603
C1045	9965 000 20349	220pF 5% 50V 0603

J1001	9965 000 27224	0Ω 5% 1/10W 0603
J1002	9965 000 27224	0Ω 5% 1/10W 0603
J1003	9965 000 27224	0Ω 5% 1/10W 0603
J1010	9965 000 27224	0Ω 5% 1/10W 0603
J1011	9965 000 27224	0Ω 5% 1/10W 0603
J1012	9965 000 27224	0Ω 5% 1/10W 0603
J1013	9965 000 27224	0Ω 5% 1/10W 0603
J1014	9965 000 27224	0Ω 5% 1/10W 0603
R1001	9965 000 13987	100Ω 5% 1/16W
R1002	9965 000 13987	100Ω 5% 1/16W
R1003	9965 000 13990	100kΩ 5% /16W
R1005	9965 000 13996	3.3kΩ 5% /16W
R1006	9965 100 08479	47Ω 5% 1/16W
R1007	9965 100 08486	1.5kΩ 5% /16W 1206
R1008	9965 000 13990	100kΩ 5% /16W
R1014	9965 000 13988	1kΩ 5% /16W
R1015	9965 000 13988	1kΩ 5% /16W
R1016	9965 000 13988	1kΩ 5% /16W
R1017	9965 000 13988	1kΩ 5% /16W

L1001	9965 000 15124	22μH 5%
L1002	9965 000 15124	22μH 5%

IC1001	9965 000 25711	IC MSP3425G
Q1003	9965 100 03003	2SC1815-Y
Q1005	9965 100 08485	BC847A (NPN)
Q1006	9965 100 08485	BC847A (NPN)

11. Revision List

Manual xxxx xxx xxxx.0
- First release.